



**PGS**  
**HERITAGE**

**THE PROPOSED VALLEY SILTS PROJECT, CITY OF  
JOHANNESBURG METROPOLITAN MUNICIPALITY, GAUTENG  
PROVINCE**

**Heritage Impact Assessment**

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## Declaration of Independence

I, Jennifer Kitto, declare that –

### General declaration:

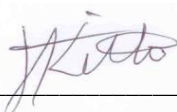
- I act as the independent heritage practitioner in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting heritage impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- All the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected from a heritage practitioner in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realise that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

### Disclosure of Vested Interest

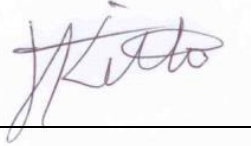


- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;

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**ACKNOWLEDGEMENT OF RECEIPT**

|                        |  |  |                                   |
|------------------------|--|--|-----------------------------------|
| <b>Report Title</b>    | <i>The Proposed Valley Silts Project, City of Johannesburg Metropolitan Municipality, Gauteng Province</i> |  |                                   |
| <b>Control</b>         | <b>Name</b>  | <b>Signature</b>   | <b>Designation</b>                |
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The heritage impact assessment report has been compiled considering the NEMA Appendix 6 requirements for specialist reports as indicated in the table below.

| Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017   | Relevant section in report   |
|--|--|
| 1.(1) (a) (i) Details of the specialist who prepared the report  | Page 2 of Report – Contact details and company   |
| (ii) The expertise of that person to compile a specialist report including a curriculum vita   | Section 1.2 – refer to <b>Appendix C</b>   |
| (b) A declaration that the person is independent in a form as may be specified by the competent authority  | Page ii of the report  |
| (c) An indication of the scope of, and the purpose for which, the report was prepared  | Section 1.1  |
| (cA) An indication of the quality and age of base data used for the specialist report  | N/A  |
| (cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;  | Section 3  |
| (d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment   | Section 4  |
| (e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used   | Section 6 and <b>Appendix B</b>  |
| (f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives; | Section 3.6  |
| (g) An identification of any areas to be avoided, including buffers  | Section 6  |
| (h) A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;   | Section 3.6  |
| (i) A description of any assumptions made and any uncertainties or gaps in knowledge;  | Section 1.3  |
| (j) A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment  | Section 3.6 and 4  |
| (k) Any mitigation measures for inclusion in the EMPr  | Section 6  |
| (l) Any conditions for inclusion in the environmental authorisation  | Section 6  |
| (m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation   | Section 6.5  |
| (n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and   | Section 7  |
| (n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and   |  |
| (n)(ii) If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan | Section 6  |
| (o) A description of any consultation process that was undertaken during the course of carrying out the study  | Not applicable. A public consultation process will be handled as part of the EIA and EMPr process. |

| Requirements of Appendix 6 – GN R326 EIA<br>Regulations of 7 April 2017   | Relevant section in report  |
|---|---|
| (p) A summary and copies if any comments that were received during any consultation process   | Not applicable. To date no comments have been raised regarding heritage resources that require input from a specialist. |
| (q) Any other information requested by the competent authority.   | Not applicable.   |
| (2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply. | Section 38(3) of the NHRA   |

## EXECUTIVE SUMMARY

PGS Heritage (Pty) Ltd (PGS) was appointed by Kongiwe Environmental (Pty) Ltd (Kongiwe) to undertake a Heritage Impact Assessment (HIA) which will serve to inform the Environmental Impact Assessment (EIA) and Environmental Management Programme (EMPr) for the proposed reclamation of gold-bearing silts from the Russell Stream north of Nasrec within the Booyens Reserve. This area is known as Valley Silts, City of Johannesburg Metropolitan Municipality, Gauteng Province.

Heritage resources are unique and non-renewable and as such any impact on such resources must be seen as significant. This report focusses specifically on the newly proposed tailings reprocessing project and associated infrastructure.

The HIA has shown that the study area and surrounding area has some heritage resources situated within the proposed development boundaries. Through data analysis and a site investigation the following issues were identified from a heritage perspective.

### Heritage Sites

The fieldwork identified two heritage features (**VS1** and **VS2**). **VS1** is a partly exposed stone structure probably related to early mining history, while **VS2** is a cemetery with approximately 50 visible graves.

#### *Historical structures*

**VS1** has a medium heritage significance with a heritage grading of IIIB.

The impact significance before mitigation on the historical structures will be **Medium** negative. Implementation of the recommended mitigation measures will modify this impact rating to an acceptable LOW negative.

#### *Burial Grounds and graves*

The cemetery at **VS2** has a high heritage rating and a heritage grading of IIIA.

The impact significance before mitigation on the cemetery and graves sites will be High negative before mitigation. Implementation of the recommended mitigation measures will modify this impact rating to an acceptable Medium to Low negative.

It should be noted that, in addition to the large informal burial ground (**VS2**) identified during the fieldwork for this project, several unmarked burial grounds have been identified and uncovered by previous development and construction projects in the surrounding area (i.e. two at Fleurhof and one at Stormill). In addition, an example of a burial ground that had been covered by a slimes dam/sand dump and was exposed after the dump had been reclaimed is known from

the Crown Mines/ Langlaagte area in Johannesburg (Anton Pelsner 2012 and pers.comm.; Esterhuysen *et al* 2018).

The communities of Riverlea have also indicated that the possibility of graves in the areas just below Riverlea does exist even though fieldwork has revealed no evidence of this.

### **Palaeontology**

The Valley Silts occur in an area where the palaeontology is assessed as being almost entirely of Low sensitivity (SAHRIS Palaeontological sensitivity map - coloured blue) and no palaeontological studies are required. Since it is anticipated that there should be no excavation into the underlying geology and the area surrounding the dumps has been disturbed extensively in the past, it is recommended that an application for exemption from the standard requirement for a Palaeontological Impact Assessment be made to SAHRA.

### **General**

It is the author's considered opinion that overall impact on heritage resources is Medium to Low. Provided that the recommended mitigation measures are implemented, the impact would be acceptably low or could be totally mitigated to the degree that the project could be approved from a heritage perspective. The management and mitigation measures as described in Section 6 of this report have been developed to minimise the project impact on heritage resources

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## TERMINOLOGY AND ABBREVIATIONS

### Archaeological resources

This includes:

- material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;
- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
- wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation; and
- features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

### Cultural significance

This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance

### Development

This means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way result in a change to the nature, appearance or physical nature of a place or influence its stability and future well-being, including:

- construction, alteration, demolition, removal or change in use of a place or a structure at a place;
- carrying out any works on or over or under a place;
- subdivision or consolidation of land comprising a place, including the structures or airspace of a place;
- constructing or putting up for display signs or boards;
- any change to the natural or existing condition or topography of land; and
- any removal or destruction of trees, or removal of vegetation or topsoil

### Early Stone Age

The archaeology of the Stone Age between 700 000 and 3 300 000 years ago.

### Fossil

Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

### Heritage

That which is inherited and forms part of the National Estate (historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).

### **Heritage resources**

This means any place or object of cultural significance and can include (but not limited to) as stated under Section 3 of the NHRA,

- places, buildings, structures and equipment of cultural significance;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features of cultural significance;
- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds, and
- sites of significance relating to the history of slavery in South Africa;

### **Holocene**

The most recent geological time period which commenced 10 000 years ago.

### **Late Stone Age**

The archaeology of the last 30 000 years associated with fully modern people.

### **Late Iron Age (Early Farming Communities)**

The archaeology of the last 1000 years up to the 1800's, associated with iron-working and farming activities such as herding and agriculture.

### **Middle Iron Age**

The archaeology of the period between 900-1300AD, associated with the development of the Zimbabwe culture, defined by class distinction and sacred leadership.

### **Middle Stone Age**

The archaeology of the Stone Age between 30 000-300 000 years ago, associated with early modern humans.

### **Palaeontology**

Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

Table 1 – List of abbreviations used in this report

| <b>Abbreviations</b> | <b>Description</b>   |
|----------------------|--|
| AIA                  | Archaeological Impact Assessment                                 |
| ASAPA                | Association of South African Professional Archaeologists         |
| CRM                  | Cultural Resource Management                                     |
| ECO                  | Environmental Control Officer                                    |
| EIA                  | Environmental Impact Assessment                                  |
| EIA practitioner     | Environmental Impact Assessment Practitioner                     |
| ESA                  | Earlier Stone Age  |
| GPS                  | Global Positioning System  |
| HIA                  | Heritage Impact Assessment                                       |
| I&AP                 | Interested & Affected Party                                      |
| LCTs                 | Large Cutting Tools  |
| LIA                  | Late Iron Age  |
| LSA                  | Late Stone Age   |
| MIA                  | Middle Iron Age  |
| MSA                  | Middle Stone Age   |
| NEMA                 | National Environmental Management Act, 1998 (Act No 107 of 1998) |
| NHRA                 | National Heritage Resources Act, 1999 (Act No 25 of 1999)        |
| PHRA                 | Provincial Heritage Resources Authority                          |
| PSSA                 | Palaeontological Society of South Africa                         |
| SADC                 | Southern African Development Community                           |
| SAHRA                | South African Heritage Resources Agency                          |

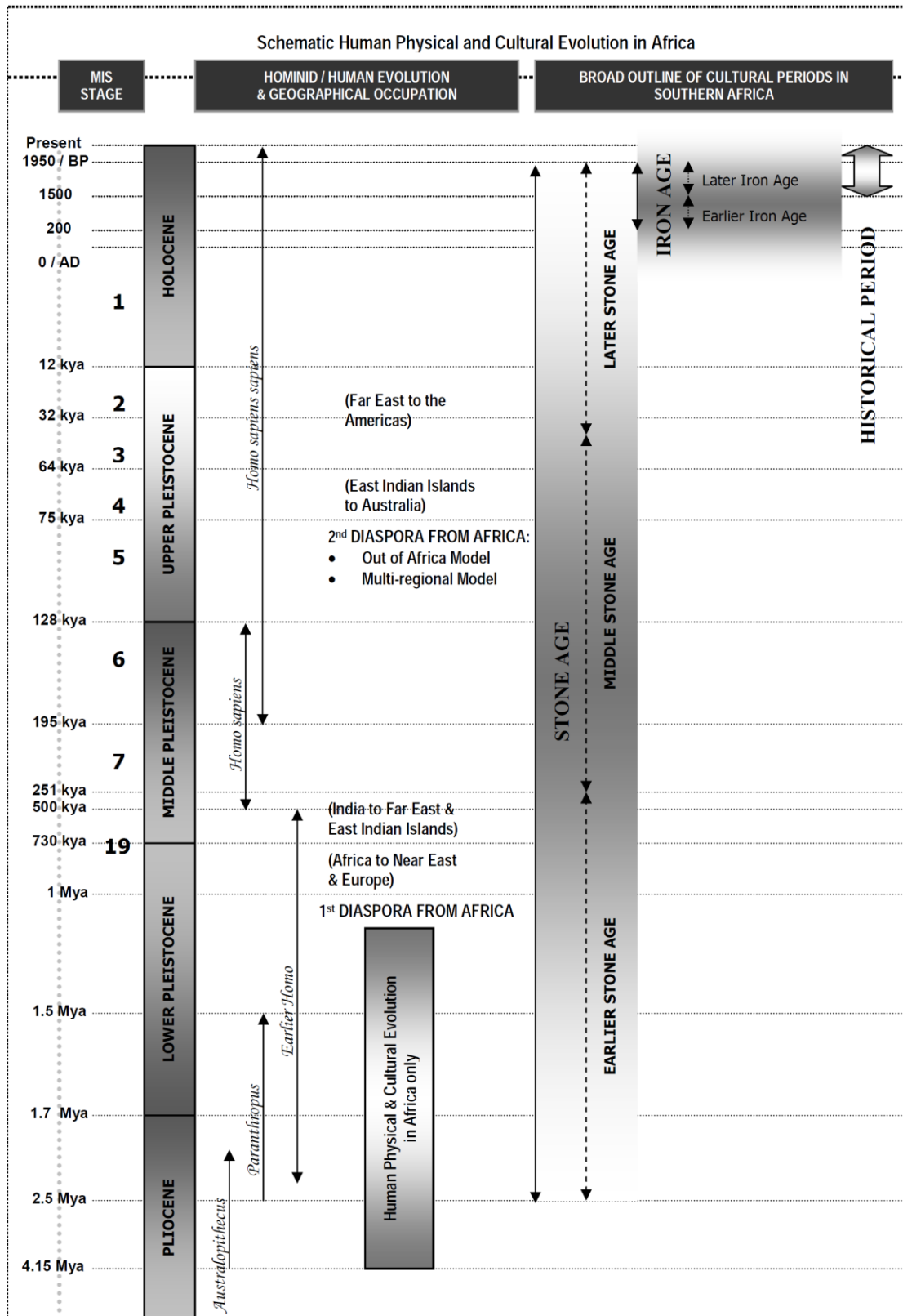


Figure 1 – Human and Cultural Timeline in Africa (Morris, 2008)

# 1 INTRODUCTION

PGS Heritage (Pty) Ltd (PGS) was appointed by Kongiwe Environmental (Pty) Ltd (Kongiwe) to undertake a Heritage Impact Assessment (HIA) which will serve to inform the Environmental Impact Assessment (EIA) and Environmental Management Programme (EMPr) for the proposed reclamation of gold bearing silts from the Russell Stream north of Nasrec within the Booyens Reserve. This area is known as Valley Silts, City of Johannesburg Metropolitan Municipality, Gauteng Province.

## 1.1 Scope of the Study

The aim of the study is to identify possible heritage sites and finds that may occur in the proposed development area. The HIA aims to inform the EIA in the development of a comprehensive EMPr to assist the project applicant in managing the identified heritage resources in a responsible manner in order to protect, preserve and develop them within the framework provided by the National Heritage Resources Act (Act 25 of 1999) (NHRA).

## 1.2 Specialist Qualifications

This HIA. was compiled by PGS.

The staff at PGS have a combined experience of nearly 40 years in the heritage consulting industry. PGS and its staff have extensive experience in managing HIA processes. PGS will only undertake heritage assessment work where they have the relevant expertise and experience to undertake that work competently.

Jennifer Kitto author of this report and Lead Heritage Specialist, has 18 years' experience in the heritage sector, a large part of which involved working for a government department responsible for administering the National Heritage Resources Act, No 25 of 1999. She is therefore well-versed in the legislative requirements of heritage management. She holds a BA in Archaeology and Social Anthropology and a BA (Hons) in Social Anthropology.

Wouter Fourie, the Project Coordinator, is registered with the Association of Southern African Professional Archaeologists (ASAPA) as a Professional Archaeologist and is accredited as a Principal Investigator; he is further an Accredited Professional Heritage Practitioner with the Association of Professional Heritage Practitioners (APHP).



### 1.3 Assumptions and Limitations

Not detracting in any way from the comprehensiveness of the research undertaken, it is necessary to realise that the heritage resources located during the desktop research do not necessarily represent all the possible heritage resources present within the area.

Such observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well.

Please note that the field survey for this project was constrained by security issues related to illegal mining activity in the footprint areas, as well as restricted access to some areas due to informal settlements and areas of extensively disturbed ground, as well as formal mining activity. In addition, heritage visibility was obscured in some areas due to dense vegetation and extensive dumping.

### 1.4 Legislative Context

The identification, evaluation and assessment of any cultural heritage site, artefact or find in the South African context is required and governed by the following legislation:

- National Environmental Management Act (NEMA), Act 107 of 1998
- National Heritage Resources Act (NHRA), Act 25 of 1999

The following sections in each Act refer directly to the identification, evaluation and assessment of cultural heritage resources.

- National Environmental Management Act (NEMA) Act 107 of 1998 – Environmental Impact Assessment Regulations GN R982 of 8 December 2014 (as amended by GN R326 of 7 April 2017)
  - Environmental Scoping Report (ESR) – Appendix 1 s (3)(h)(iv) and Appendix 2 s(2)(g)(iv)
  - Environmental Impact Assessment (EIA) – Appendix 3 s (3)(h)(iv)/
- National Heritage Resources Act (NHRA) Act 25 of 1999
  - Protection of Heritage Resources – Sections 34 to 36; and
  - Heritage Resources Management – Section 38

The NHRA is utilized as the basis for the identification, evaluation and management of heritage resources and in the case of Cultural Resource Management (CRM) those resources specifically impacted on by development as stipulated in Section 38 of NHRA. This study falls under s38(8) and requires comment from the relevant heritage resources authority.

## 2 SITE LOCATION AND DESCRIPTION

### 2.1 Locality and Site Description (provided by Ergo Mining)

Ergo Mining (Pty) Limited (Ergo) intends to make use of its current infrastructure as well as other assets held by DRDGold Ltd (DRD) for the Valley Silts project. The retreatment of historic mine residue areas is a low risk and high-volume business. The aim of the project is to reclaim gold bearing silts from the Russell Stream north of Nasrec within the Booyens Reserve. This area is known as Valley Silts (**Figure 2**).

In terms of locality, the project is located within the Russell Stream valley, located within Booyens Reserve. The proposed project area covers an approximate area of 122 ha. The project area stretches from New Canada Road, and follows the valley south east (upstream), past the Nasrec Road bridge and past Crownwood Road until the stream meets the M1. The proposed project area associated with the Valley Silts reclamation project is situated within Ward 68 and Ward 124 of the City of Johannesburg Metropolitan Municipality (CoJMM). Major routes around the Russell Stream are; the N17, which runs east to meet with Nasrec Rd or west to join the N1 Western bypass. The N1 Western Bypass which runs north to Pretoria and south out of the Gauteng province. The M70 (Soweto Highway) which leads west into Soweto and east into Booyens. The M17 (Crownwood road) which crosses the project area leading north to Mayfair and south to the N12 Southern Bypass. The suburbs of Riverlea, Theta and Amalgam are located immediately around the Valley Silts project area (**Figure 3**).

The following infrastructure is encountered in the area:

- National and provincial roads (M70, M17, N17, N1);
- Residential and commercial properties;
- Industrial properties;
- Power lines;
- Water reticulation systems; and
- Historic Mine Dumps.

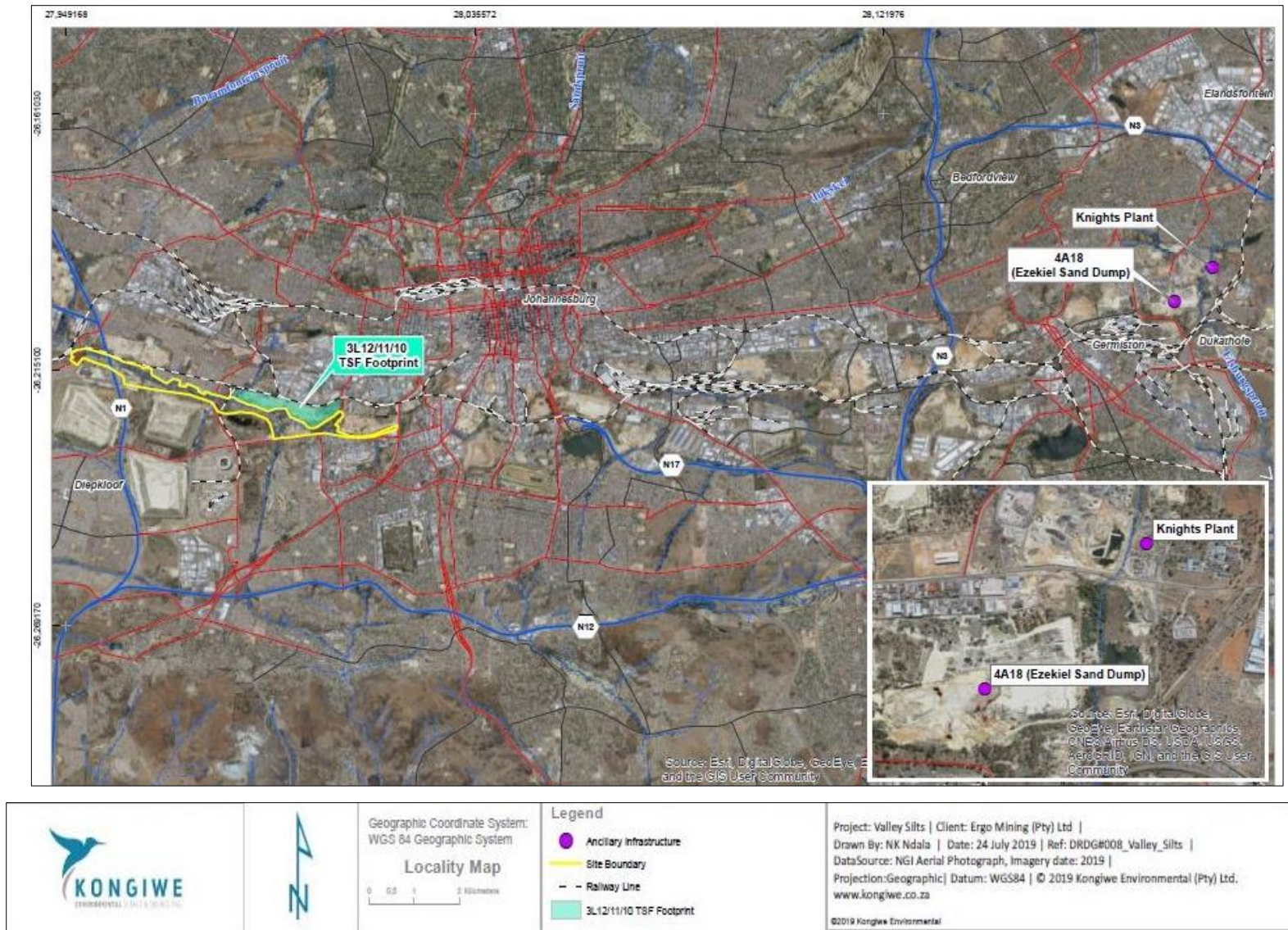


Figure 2 – Regional setting of the study area

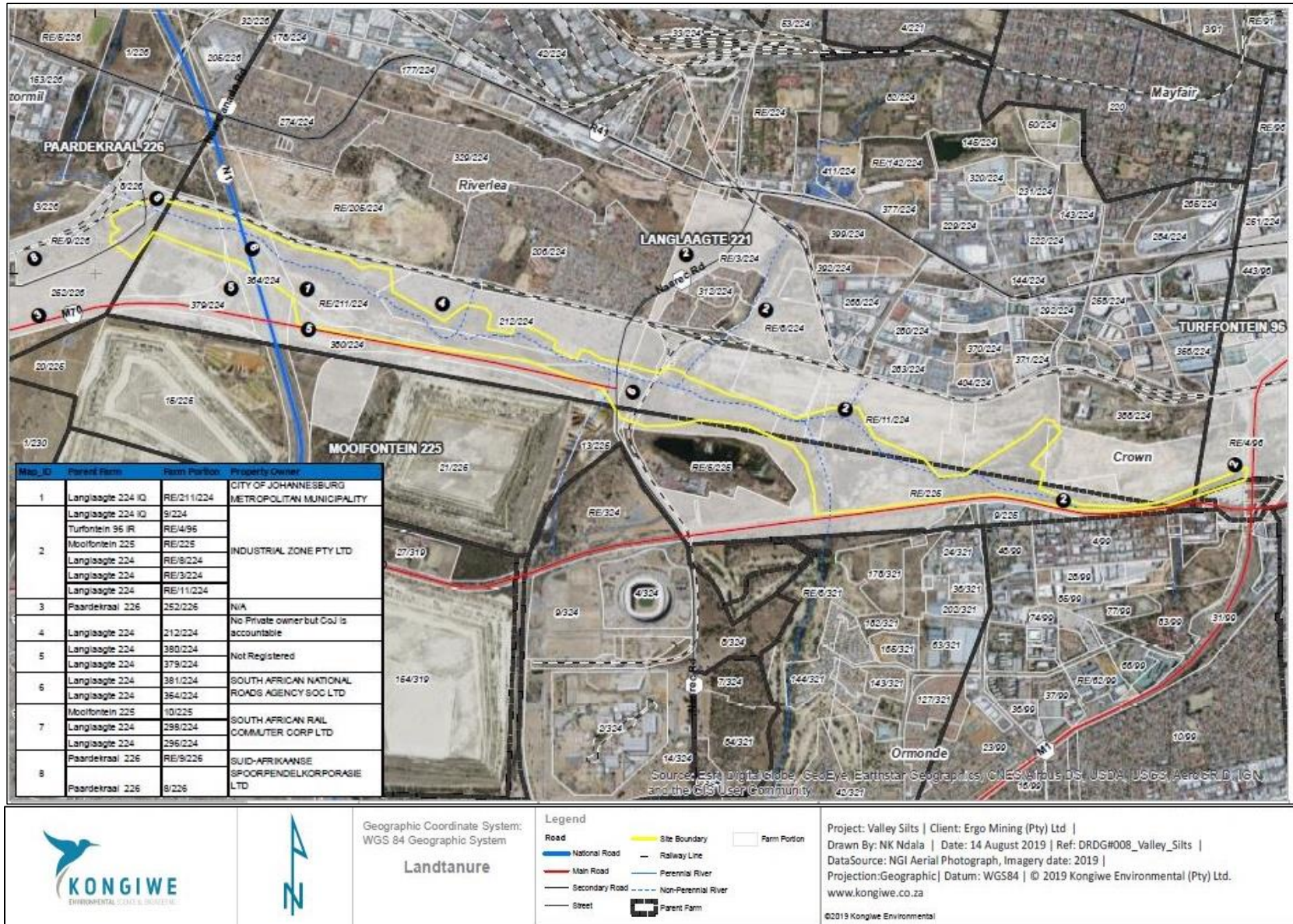


Figure 3 – Locality of the Valley Silts area

## 2.2 Project description

Ergo intends to excavate the gold bearing silts from the Russell Stream mechanically by using excavators (**Figure 4**). The removed silts will be stockpiled and dried on the TSF 3L10/11/12 footprint, before being hauled to the Ezekiel site. Once at the Ezekiel site the dried silts will move through a hopper and water will be added to create a slurry. From the Ezekiel site the slurry will be pumped to the Knights Plant for beneficiation. At the Knights Plant the material will be reprocessed and the gold will be reclaimed from the silt/slurry. From the Knights plant the tailings will move through an existing pipeline to the Brakpan/Withok tailings storage facility (TSF) where the ultimate deposition will occur. These silts contain a high grade of gold and are accordingly amenable to reprocessing.

The area in which the stream lies, which contains the gold bearing silts, is known as Valley Silts. The gold bearing silts originated from localised erosion on the surrounding slime dams and sand dumps, which were accordingly transported into the Valley Silts area via surface runoff and stream flow.

As far as possible, existing access roads will be utilised, and where this is not possible, these will be constructed as a two-by-two roadway, operating in both directions. Where access roads are to be constructed, these will be 4m wide gravel road with storm water earth channels and mitre drains to protect the road structure from flood damage. Intersections will be properly designed to provide safe entry and exit into the project area. Approvals from the provincial road's authority will be obtained where necessary.

Power will be supplied by Eskom and potable water will be purchased from Rand Water, with a contingency for portable JoJo tanks or connection to existing water pipeline infrastructure. The life of the operation for the proposed project is expected to be approximately 10 years. The Knights plant will have the capacity to process 80 000 – 90 000 tons of slurry a month. 50 trucks will service the proposed project area daily. It is estimated that 1 truck can transport 15 tons of silt in one trip, these trucks will do 4 trips a day. This in total leads to 3 000 tons of silt being removed from the Russell Stream daily.

### 2.2.1 Description of Proposed Reclamation Methods:

Mechanical removal of gold bearing silts:

The gold bearing silts will be mechanically removed. Excavators will be used to remove the silts from the Stream, and 30 tonne articulated dump trucks (ADTs) will be used to place the deposits outside the stream on site to dry on TSF 3L10/11/12. The dried silt deposit will then be loaded onto trucks and hauled to Ezekiel and hence to the plant for beneficiation.

Rehabilitation: The removal of the gold bearing silts from target areas in the Russell Stream will lead to the removal of waste from the natural and wetland environment. The removal of this waste will aid in the rehabilitation of the Stream and wetland in the valley stream area. The removal of the silts from the stream will help restore the natural flow dynamics of the stream, and after rehabilitation has occurred the area's freed draining will be restored and indigenous vegetation will be planted. The land will be handed over to the landowners, once the gold bearing silts have been removed, and the area has been cleared of radiation and closure has been received from the Competent Authority (CA). The final land use will then be at the discretion of the landowners. It is anticipated that the project could free up the area for greenbelt development.

### *2.2.2 Estimated Project Timeframes*

The anticipated life span of the project is approximately 10 years.

### *2.2.3 Consideration of Alternatives:*

The proposed Valley Silts project is desilting project and reclamation, and geographically this project has no alternative. The described process and method related to the project is the only viable option. This means that the project has no alternatives. The main aim of the project is to remove the environmental nuisance of gold bearing silts from the Russell stream. The removal of this environmental and social nuisance will aid in the rehabilitation of the wetlands in and around the Valley silts area as well as help alleviate certain social issues which plague the surrounding communities.



Figure 4 – Proposed mining plan for the initial development area in Valley Silts.

### 3 CURRENT STATUS QUO

#### 3.1 Site Description

The greater Johannesburg region is synonymous with historical mining activities since the original farms including Langlaagte and Randjieslaagte were proclaimed as public diggings by the then Zuid-Afrikaansche Republiek (ZAR) government in 1886.

Existing surrounding land uses associated with the project area include a combination of:

- informal settlements, low-cost residential areas;
- community and municipal facilities;
- industrial areas;
- manufacturing and distribution facilities, commercial businesses;
- historical mine housing and historical mine infrastructure (slimes dams, shafts, derelict/abandoned buildings and water dams);
- illegal informal mining activities, formal mining activities;
- open land, and
- road infrastructure.

As a result, the vast majority of the Valley Silts Project footprint overlays highly disturbed developed terrain. There is also evidence of illegal mining and dumping activities within the project area. Overall, the accessibility of the project footprint area was variable, with some sections more accessible than others. In the accessible areas the site detection visibility was relatively good as some areas had been burned, although other areas were obscured by dense vegetation (**Figure 5** to **Figure 14**).



*Figure 5 - Access from Crownwood road to the Mining Right area*



*Figure 6 - View of the silted stream just east of the Crownwood road bridge crossing*





*Figure 7 - Illegal mining activity close to the Mining Rights area*



*Figure 8 - View of old Crownwood road bridge*



*Figure 9 - Silted up stream area just east of the Russell stream*



*Figure 10 - View of silted wetland originally called Golf Lake*



*Figure 11 - Stream just to the south of Riverlea*



*Figure 12 - Silts to the west of the Riverlea residential area*



Figure 13 – Rocky ridge between The N1 and Riverlea extension



Figure 14 – Silted stream and wetland just west of Riverlea

### 3.2 Overview of Study Area and Surrounding Landscape

| DATE                                   | DESCRIPTION   |
|--|---|
| 2.5 million to 250 000 years ago       | The Early Stone Age is the first and oldest phase identified in South Africa's archaeological history and comprises two technological phases. The earliest of these is known as Oldowan and is associated with crude flakes and hammer stones. It dates to approximately 2 million years ago. The second technological phase is the Acheulian and comprises more refined and better made stone artefacts such as the cleaver and bifacial hand axe. The Acheulian dates back to approximately 1.5 million years ago (Korsman, & Meyer, 1999).   |
| 250 000 to 40 000 years ago            | The Middle Stone Age (MSA) is the second oldest phase identified in South Africa's archaeological history. This phase is associated with flakes, points and blades manufactured by means of the so-called 'prepared core' technique (Korsman, & Meyer, 1999).   |
| 40 000 years ago, to the historic past | The Later Stone Age (LSA) is the third archaeological phase identified and is associated with an abundance of very small artefacts known as microliths. (Korsman, & Meyer, 1999).   |
| AD 450 – AD 750                        | Early Iron Age (EIA) sites in the Witwatersrand area date between 500 AD and 900 AD. The Magaliesberg mountain range represents the most southern point of distribution of these sites. The Mzonjani facies of the Kwale Branch of the Urewe Ceramic Tradition represents the earliest known Iron Age period within the surroundings of the study area. The decoration on the ceramics from these facies is characterised by punctates on the rim as well as spaced motifs on the shoulder (Huffman, 2007).<br>No EIA sites are known from the immediate vicinity of the footprint area |
|  | The Late Iron Age (LIA) occupation of this area by Sotho-Tswana communities is represented by four ceramic sequences of the Urewe tradition: Ntsuanatsatsi (1450-1650), Olifantspoort (AD 1500 -1700), Uitkomst (AD 1700-1850) and Buispoort (1700-1840) (Huffman 2007).<br>No LIA sites are known from the immediate vicinity of the footprint area.   |
| AD 1450 – AD 1650                      | The Ntsuanatsatsi facies of the Blackburn Branch of the Urewe Ceramic Tradition represents the second known Iron Age period within the surroundings of the study area. The decoration on the ceramics from this facies is characterised by a broad band of stamping in the neck, stamped arcades on the shoulder and appliqué. Huffman (2007) suggest that the Ntsuanatsatsi  |

| DATE                     | DESCRIPTION  |
|--------------------------|--|
|                          | <p>facies can be directly linked to the early Bafokeng who were the first Mbo Nguni people to leave present-day KwaZulu-Natal.</p>   |
| <p>AD 1500 - AD 1700</p> | <p>The Olifantspoort facies of the Moloko Branch of the Urewe Ceramic Tradition is the third Iron Age facies to be identified within the surroundings of the study area. The Olifantspoort facies can likely be dated to between AD 1500 and AD 1700. The key features of the decoration used on the ceramics from this facies include multiple bands of fine stamping or narrow incision separated by colour (Huffman, 2007). The type site for this facies is located on the farm Olifantspoort 328 JQ, near Rustenburg in the North West Province.</p> <p>The Olifantspoort facies holds an important position in the sequence of the Moloko or Sotho-Tswana group. The earliest facies to be associated with the Moloko is the Icon facies (AD 1300 – 1500), with sites found across large sections of what is today the Limpopo Province. The Icon facies resulted in three different and parallel Iron Age facies, namely the Madikwe facies (AD 1500 – 1700) (which in turn led to the Buispoort facies between AD 1700 and 1850), the Letsibogo facies (AD 1500 – 1700) and thirdly the Olifantspoort facies. The Olifantspoort facies developed into the Thabeng facies (AD 1700 – 1850) (Huffman, 2007). It is therefore evident that the Olifantspoort facies represents a key pillar in our understanding of the origins and sequence of the Sotho-Tswana people of today (Huffman, 2007).</p>   |
| <p>AD 1650 – AD 1850</p> | <p>The Uitkomst facies of the Blackburn Branch of the Urewe Ceramic Tradition represents the third Iron Age period to be identified for the surroundings of the study area. This facies can likely be dated to between AD 1650 and AD 1820. The decoration on the ceramics associated with this facies is characterised by stamped arcades, appliqué of parallel incisions, stamping and cord impressions and is described as a mixture of the characteristics of both Ntsuanatsatsi (Nguni) and Olifantspoort (Sotho) (Huffman, 2007).</p> <p>The type-site Uitkomst Cave, was excavated by Professor R.J. Mason of the University of the Witwatersrand as part of a project to excavate five cave sites (Glenferness, Hennops River, Pietkloof, Zwartkops and Uitkomst) in the Witwatersrand-Magaliesberg area. Uitkomst was chosen as the type site for the particular Iron Age material excavated at these sites, as its deposit was found to be well stratified and the site "...illustrates the combination of a certain kind of pottery with evidence for metal and food production and stone wall building found at the open sites..." (Mason, 1962:385).</p> <p>The Uitkomst pottery is viewed as a combination of Ntsuanatsatsi and Olifantspoort, and with the Makgwareng facies is seen as the successors to the Ntsuanatsatsi facies. The Ntsuanatsatsi facies is closely related to the oral histories of the Early Fokeng people and represents the earliest known movement of Nguni people out of Kwazulu-Natal into the inland areas of South Africa. Regarding this theory, the Bafokeng settled at Ntsuanatsatsi Hill in the present-day Free State Province. Subsequently, the BaKwena lineage had broken away from the Bahurutshe cluster and crossed southward over the Vaal River to come in contact with the Bafokeng. As a result of this contact a Bafokeng-Bakwena cluster was formed, which moved northward and became further 'Sotho-ised' by coming into increasing contact with other Sotho-Tswana groups. According to this theory, this eventually resulted in the appearance of Uitkomst facies type pottery which contained elements of both Nguni and Sotho-Tswana speakers (Huffman, 2007). Huffman states that the Uitkomst facies is directly associated with the Bafokeng (Huffman, 2007). However, it worth noting that not all researchers agree with this proposition of the Bafokeng origins. In their book on the history of the Bafokeng, Bernard Mbenga and Andrew Mason indicate that the research of Prof. R.J. Mason and Dr. J.C.C. Pistorius "...would indicate that the Bafokeng originated from the Bahurutshe-</p> |

| DATE              | DESCRIPTION   |
|-------------------|---|
|                   | Bakwena-Bakgatla lineage cluster. Tom Huffman holds a different view..." (Mbenga & Mason, 2010).  |
| AD 1700 – AD 1840 | The Buispoort facies of the Moloko branch of the Urewe Ceramic Tradition is the next phase to be identified within the greater Witwatersrand area. It is most likely dated to between AD 1700 and AD 1840. The key features on the decorated ceramics include rim notching, broadly incised chevrons and white bands, all with red ochre (Huffman, 2007). It is believed that the Madikwe facies developed into the Buispoort facies. The Buispoort facies is associated with sites such as Boschhoek, Buffelshoek, Kaditshwene, Molokwane and Olifantspoort (Huffman, 2007). |

### 3.3 Previous Archaeological and Heritage Studies in and around the Study Area

A scan of the South African Heritage Resources Information System (SAHRIS) database has revealed the following studies conducted in and around the study area of this report, including a previous heritage impact assessment study for the proposed Reclamation of the Soweto Cluster Dumps (du Piesanie 2014). These studies are summarised below in ascending date order:

- Application for Permit: Archaeological and Palaeontological Sites and Meteorites – Old Crown Mines Cemetery,
- **Fourie, M. 2010. Heritage Scoping Assessment and Notice of Intent to Develop for the Proposed Pipeline Project. For Crown Gold Recoveries (Pty) Ltd by Digby Wells & Associates.** No potential heritage resources were observed in the project area.
- **Van der Walt, J. 2013. Archaeological Impact Assessment for the Proposed Filling Station on Erf 330 Crown Extension 18, Crown Mines, Gauteng Prepared for Marinda le Roux.** Apart from an avenue of Plane trees on the northern periphery of the site no other sites of heritage significance were identified on Erf 330. However, the site is adjacent to the Provincial Heritage site of Langlaagte Deep Mining village also known as Crown Village
- **Van Schalkwyk, 2016. Heritage Impact Assessment for the Proposed Installation of Turffontein Corridor Conduits and Outfalls Storm Water Management Systems, City of Johannesburg District Municipality, Gauteng Province. For Envirolution Consulting.** A very large number of features, mostly houses and infrastructure related features occur in the region. All of these are very formal and clearly visible. Due to the fact that the development will take place inside the road reserve, it was considered unlikely that any such features would be impacted by the construction of the storm water corridor conduits and outfalls.

### **3.4 Historical Background of Johannesburg, including Riverlea, Booyens, Ophirton**

#### *3.4.1 Johannesburg,*

The City of Johannesburg developed from a mining camp after gold-bearing conglomerate was discovered on the farm Langlaagte in 1886 by George Harrison and George Walker, more or less at the same time as discoveries in the Krugersdorp/Roodepoort area by JG Bantjies and the Struben brothers. By September 1886, around 2500 people were living in the general area and 1300 diggers licenses had been issued (Erasmus, 2014). Due to the discovery of the reef and the sudden influx of miners, a special proclamation was issued by the ZAR government, also in September 1886, listing nine farms that were proclaimed as public diggings. The southern portion of the farm Doornfontein was one of these farms. Another of the farms, Randjeslaagte, was owned by the State and was chosen as the site for the new mining town in order to provide revenue for the Government (Erasmus, 2014).

The town was accordingly surveyed and named Johannesburg (apparently, since both the vice-president, Joubert and the survey clerk Rissik were named Johannes – Erasmus 2014). A health committee was elected in November 1887. On 1 October 1897, the fledging town was granted a town council followed by municipal status. However, ongoing issues with the so-called *uitlander* population of the town and the British government, which were realised to be due to the rich gold resources, ultimately resulted in the Second South African Wars. Notwithstanding this, Johannesburg was relatively unaffected by the conflict until it was occupied by the British forces on 31 May 1900 with virtually no resistance. The mines which had been closed reopened almost immediately after the end of the war in 1902. After this Johannesburg and its suburbs grew very rapidly (Erasmus, 2014).

#### *3.4.2 Booyens and Booyens Reserve*

Smith (1977) states several sources as indicating that the original property was owned by a man called Booyen (Johannes or Jan or JA Booyen). She further states that the township was laid out by the Booyen Farm syndicate on the farm Turffontein in 1887. The first stands were apparently sold in May and June 1887.

Booyens Reserve was surveyed in 1896 and the first stands were auctioned the same year. The “mynpacht” on which the township was established was used as agricultural holdings at the time as it was one of the few properties that were unproclaimed.

#### *3.4.3 Riverlea*

This township was laid out on the farm Langlaagte No.13 on 25 May 1965 as a township for coloureds. The establishment of the township Riverlea (or riverly) had been recommended by the Johannesburg Council in August 1960. The street names were all based on rivers. By 1965 three

extensions had been established. The name apparently indicates an area where there is a river (Smith 1977).

#### 3.4.4 *Ophirton*

Smith (1977) notes that this suburb was one of the earliest residential areas in Johannesburg. The township was laid out in 1887 on the farm Turffontein No. 21, although the name of the area seems to have changed several times during the late 1800s. However, the present-day township dates from 1903 when the plan was confirmed by the Surveyor-General. By that date, the property belonged to the Robinson Deep Gold Mining Company although the name of the suburb probably derives from one of the previous land-owners, the Paarl-Ophir Gold Mining Co. Ltd. Smith (1977) also notes that the land changed ownership several times and was owned by CL Liebenberg before being purchased for the establishment of the township.

#### 3.4.5 *Brief History of Soweto*

The township of Soweto was established on the farms Doornkop, Klipriviersoog, Diepkloof, Klipspruit and Vogelstruisfontein. Initially, the township comprised 26 individual areas, which were each designed to be a self-sufficient entity. After World War 2 the area was consolidated into the township of Soweto (an acronym for South Western Townships) (Erasmus, 2014).

Beginning with the establishment of Klipspruit in 1904, the process of Soweto's creation ended only with the final removal of all Africans from the Western Areas (the freehold townships of Sophiatown, Martindale and Newclare) in 1955-58 (Pohlandt-McCormick and Travis, 2010). By 1959, the patchwork of townships—Moroka, Pimville, Klipspruit, Orlando East, Dube, Mofolo North and South, Central Western Jabavu, Molapo, and Moletsane—still had no name and a competition was held to find a suitable name. However, the final name was approved only in 1963, being a composite of the opening letters of South West Townships (Pohlandt-McCormick and Travis, 2010).

By 1927 the Johannesburg City Council (JCC) had decided to create a Department of Native Affairs to deal with matters concerning local African administration. In 1929, with the pressures of influx of African people to Johannesburg, the removal of African people from the whites-only designated residential areas became a priority for the council. So began a process of segregation and removals to the area now known as Soweto ([www.sahistory.org.za](http://www.sahistory.org.za)).

The already established Non-European Affairs Department (NEAD) was then tasked with the responsibility of establishing or acquiring large-scale housing scheme to accommodate approximately 80 000 Blacks into a township (Hanyane 2002). Subsequently, the Johannesburg City Council bought the farm Klipspruit No. 8 from one of the mining companies and established the township of Orlando East, named after Edwin Orlando Leake, the chairman of the NEAD at the time (Hanyane 2002; Van Rensburg, 1986).

Once the National Party government came into power in 1948, it embarked upon an aggressive policy of slum clearance. This policy involved the forced removal of Africans from the freehold townships of the Western Areas, such as Sophiatown, Martindale and Newclare to Diepkloof, Meadowlands, Dube and Rockville. Similar attempts of slum clearance in Alexandra resulted in communities removed from this township being resettled in Diepkloof and Meadowlands. Forced removals began in 1955 and five years later, the resettlement of African families from the Western Areas to Soweto had been completed.

James Mpanza founded the Sofasonke Party in 1938 and on 20 March 1944, he led a group of homeless people to a stretch of vacant land across the river and boundaries of Orlando Township where they erected their shacks. Within a short period of time, the number of people staying in Shantytown reached 4000. The land invasion in Orlando was followed land invasions from Pimville, west and east of Johannesburg, in 1947. In the previous year, James Mpanza had led another invasion of houses still under construction, which were intended to house people removed from the city centre. These invasions forced the government to concede that the need for housing in the township was very dire and that the City Council lacked the financial resources required to house the township population. As the squatter problem became unwieldy, the JCC decided to set up controlled site-and-service schemes in Moroka and Jabavu. The Moroka emergency camp was established in 1954. The arrangement of shacks was later consolidated into normal street blocks.

Between 1947 and 1960, the government embarked upon a massive housing scheme at the end of which the Moroka and Jabavu emergency camps were demolished. Residents of Moroka and Jabavu emergency camps were relocated in Moletsane, Molapo, Tladi, Naledi, Senaoane, Dlamini, White City and Jabulane (<http://www.sahistory.org.za/topic/history-soweto>)

On June 16, 1976, one of the most significant events in the history of Soweto and South Africa took place: a demonstration against the imposition of Afrikaans as a medium of instruction in schools, planned as a one-day protest in Soweto, escalated into a nationwide uprising after police shot dead a number of student demonstrators, including 13-year-old Hector Peterson, touching off a spiral of rioting and reprisal that rapidly spread to other areas (Gerhart, 1994).

### *3.4.6 History of Gold Mining within the Study Area and Surrounding Landscape (Birkholtz 2006 and 2017)*

#### *3.4.6.1 Langlaagte Farm*

The original Langlaagte farm had been divided into four portions by 1885/86. Portion A was owned by Andries Luan Breedt, Portion B by Anna Elizabeth de Beer Mulder (formerly Oosthuizen), Portion C by Gerhardus Cornelis Oosthuizen and Portion D by the widow Petronella Oosthuizen and her son Johan Hendrik Oosthuizen (Davenport 2013). Portion D was the easternmost portion of the farm and Mr JH Oosthuizen had hired George Harrison, an Australian digger, to build a house on that portion (Davenport 2013; Stephens 2003).

Subsequently, Harrison and his friend George Walker, discovered an outcrop of the gold-bearing reef on the neighbouring portion of the farm, which belonged to G.C. Oosthuizen. Harrison and Walker then entered into an agreement with G.C. Oosthuizen during April 1886, which enabled them to prospect for gold and each peg a claim on the property should the strike prove to be payable (Davenport 2013; Stephens 2003). Richardson (2001) states that the two claims given to Harrison and Walker were numbers 19 and 21. Shortly after the agreement between Oosthuizen and the two Georges, the news about the gold discovery on the farm spread quickly and resulted in a rush of prospectors to the outcrop, several of whom formed the Langlaagte Company, to work the outcrop on Portion B of the farm (Davenport 2013).

It was not long before the gold reef was located on a number of the neighbouring farms to Langlaagte, including Turffontein. Shortly after these discoveries, President Kruger received three petitions requesting that the farms Vogelstruisfontein, Roodepoort, Langlaagte and the two portions comprising Paardekraal be declared public diggings, as well as several other farms. Subsequently, on 8 September 1886, a notice in the “De Staatscourant” informed all interested parties that the government had located yielding gold reefs on the Witwatersrand in the district of Heidelberg, on various farms, including Langlaagte and Turffontein. Langlaagte was to be declared a public prospecting area on the 4 October 1886 and Turffontein on Monday 27 September (Davenport 2013; Roux 1955).

When the news of the gold discoveries on Langlaagte and the surrounding farms reached Kimberley, JB Robinson was one of the first people to investigate the situation, arriving at Langlaagte in July 1886. He quickly arranged to first lease and then buy Portion D of the farm from the widow Oosthuizen, as well as buying Portion B from Anna de Beer Mulder. Robinson also bought shares in other properties that adjoined Langlaagte, including a half-share in a lease of the farm Turffontein. The Robinson Deep Mine and Crown Mines would later be established on these two farms (Davenport 2013).

#### *3.4.6.2 Mooifontein Farm*

Smith (1977) states that the farm Mooifontein is depicted on Wyld’s New Map of Witwatersrand Goldfields (1889) as being situated between the farms Langlaagte and Diepkloof. She notes that there was probably a “mooi fontein” located on the property at the time. She doesn’t provide any information on the ownership of the farm. Davenport (2013) notes that the mining properties on Mooifontein were among those amalgamated under the control of the Crown Mines Limited company sometime after the South African War.



### 3.4.6.3 Gold Mining companies

Troy's Map of the Witwatersrand Goldfields (1890) indicates that there were several gold mining companies associated with the farm Langlaagte but no gold mining companies situated on Mooifontein. The farms situated on Langlaagte at that date were, Inter alia:

- Western Langlaagte
- Croesus
- Bantjies
- Block 8
- Langlaagte Estate
- Langlaagte United
- Langlaagte Main Reef
- Langlaagte Central
- Pritchards Claims
- Crown Reef Gold Mining Company

Troy's map also depicts the Booyen Land Company, on land situated to the south-east of Langlaagte, as well as several unnamed streams running across Langlaagte, including the present day stream known as the Russell Stream.

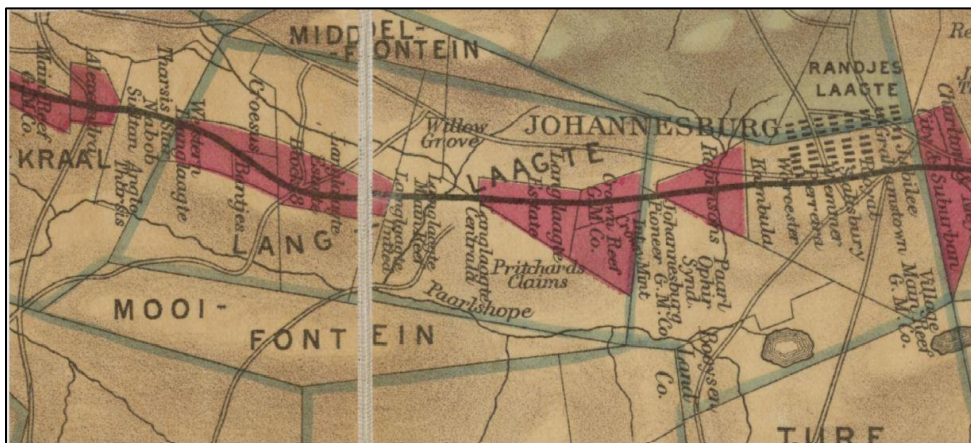


Figure 15 - Enlarged section of Troy's Map of the Witwatersrand Goldfields (*The Digger's News Printing & Publishing Co Ltd.*), dated 1890

Gold mining shares boomed in 1895. However, this boom and the progress of the gold mining industry was affected severely by the Jameson raid at the end of 1895. The farm of Vlaktefontein, in the present-day Roodepoort area was the scene of the surrender of Jameson's party to Genl. Cronje., whose Boer forces held the koppie of Doornkop, blocking the way to Johannesburg (Payne, 1948).

The following gold. Mining companies were associated with the study area (**Figure 16**).

#### *3.4.6.4 Crown Mines (Skinner 1911)*

This company was registered on 31 March 1892 as the Rand Deep Level Gold Mining company, Limited. Crushing commenced in August 1897. In June 1894 the name was changed to Crown Deep Limited and in June 1909 to Crown Mines Limited, on the acquisition of various interests additional to the original properties. The company originally owned 183.7 Main Reef deep level claims on the farms Langlaagte and Turffontein. In 1898, 1 593 claims were sold to the Robinson Central Deep Limited for 107 538 shares in that company, and the right to subscribe for a further 35 846 shares at £2.

Crown Mines was controlled and administered as part of the larger Rand Mines Limited group (Skinner 1911).

#### *3.4.6.5 Consolidated Langlaagte Mines, Limited.*

This company was registered in the Transvaal September 20th, 1902, to acquire the undertakings of the New Croesus Gold Mining Co., Ltd. (registered October, 1891), and the Langlaagte Star Gold Mining Co., Ltd. (registered 1894). The property consists of a compact block of 343 claims and 210 deep level claims on the farm Langlaagte, Transvaal; also, three pieces of ground equal to 30 claims held under lease for erecting plant or buildings and six water rights. The deep level claims were acquired in November 1903, from the Johannesburg Consolidated Investment Co., Ltd.

#### *3.4.6.6 Langlaagte Estate & Gold Mining Co., Ltd.*

This company was registered on January 13th, 1888, to acquire three portions of the farm Langlaagte, viz., Restante, Block A and Block B, and adjoining farm Middelfontein, a total area of 4 070 acres, including mining claims and water-rights situated in the Witwatersrand district, close to Johannesburg, Transvaal. Crushing commenced in 1888 with 10 stamps. The Chairman was Sir J. B. Robinson.

This company was not indicated as being part of a larger group at the time of Skinner 1911.

#### *3.4.6.7 Robinson Gold Mining Company Limited*

This company was registered in the Transvaal in 1887, to acquire a lease of a portion of the farm Turffontein, Witwatersrand, with a "mynpacht" of about 220 acres on the Main Reef. Hermann Eckstein was one of the Directors. In 1889, the property of the Kambula Syndicate, comprising six Main Reef claims and 100 acres of the "mynpacht" was acquired. In 1891, the company acquired the freehold of the "mynpacht". In 1893, 30 southern claims were acquired. In 1898, 616 claims were sold to the Robinson Central Deep Ltd. (now Crown Mines). Part of the larger Rand Mines, Ltd. controlling group.

#### 3.4.6.8 *Robinson Deep Gold Mining Company, Limited.*

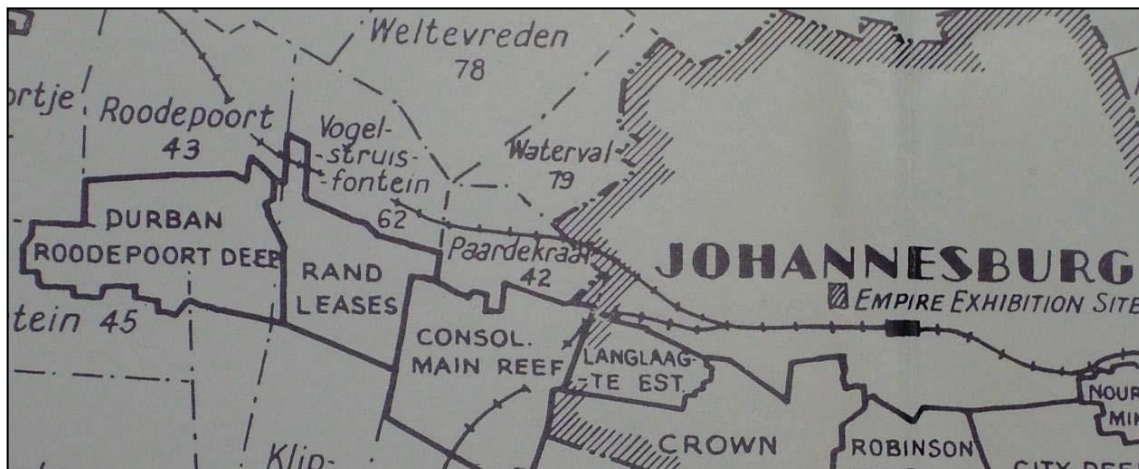
This company was first registered in the Transvaal September 19th, 1894, as the Robinson Deep, Ltd., to acquire from the Goldfields Deep, Ltd., about 148 main reef dip claims south of the Robinson Mine, Witwatersrand, Transvaal. A further 86 claims on the dip of the Worcester and Ferreira mines were afterwards purchased from the Paarl Ophir Co.

#### 3.4.6.9 *Consolidated Gold Fields of S.A Ltd.*

This company was registered August 2nd, 1892, to acquire the undertakings of the Gold Fields of South Africa, Ltd., the African Estates Agency, Ltd. and the African Gold Share Investment Co., Ltd., and the assets of the South African Gold Trust and Agency Co., Ltd. The company sold its holding of deep level claims in the Witwatersrand district of the Transvaal to the Goldfields Deep, Ltd, in 1893, but repurchased the entire undertaking of that company in 1898.

#### 3.4.6.10 *Rand Mines, Limited.*

This company was registered in the Transvaal February 22nd, 1893, to acquire and deal with various mining claims in the Witwatersrand district, Transvaal, also the Mooifontein farm of 1 294 acres, south of Langlaagte, Witwatersrand. The company has dealt with a large number of claims and properties and has received blocks of shares in subsidiary and other concerns.



*Figure 16 - A portion of the general plan of the Witwatersrand Gold Fields dated to 1936. The Durban Roodepoort Deep mine and the Rand Leases mine can be seen on the left (map from Letcher, 1936)*

#### 3.4.6.11 *First World War*

The First World War caused the cost of mining operations to rise considerably and this resulted in the closure of several mines between 1917 and 1928, including the Roodepoort United, which had been one of the biggest mines (Payne, 1948).

In 1934, the property and assets of the New Steyn Estate were taken over by the Durban Deep mining company. These included the claims, plant and building of the old Roodepoort United. By 1948, the Durban Deep owned 3,007 mining claims on the farms Roodepoort, Vogelstruisfontein, Vlakfontein and Witpoortjie. In addition, its freehold property measured 4,443 morgen (Payne, 1948).

#### 3.4.7 Conclusions

The archival and historical research has revealed that the entire area on which the historical slimes dams and sand dumps are situated, has been affected on a continual basis by historical mining activities, since c.1886/87 and was associated with several historical gold mine companies, the major one being Crown Mines. These mining activities have continued to the present day, both formally and informally (illegal). The ground affected by the proposed environmental authorisation application is therefore extremely disturbed. There is also high potential for the existence of heritage sites associated with the historical mining activities (e.g. historical mining structures, historical residential structures, and historical graves and burial grounds).

### 3.5 Archival/historical maps

The examination of historical data and cartographic resources represents a critical tool for locating and identifying heritage resources and in determining the historical and cultural context of the study area. Relevant topographic maps and satellite imagery were studied to identify structures, possible burial grounds or archaeological sites present in the footprint area.

Topographic maps (1:50 000) for various years (1939 and 1943, 1954, 1975 and 1977) were assessed to observe the development of the area, as well as the location of possible historical structures and burial grounds. The maps were also used to assess the possible age of structures located, to determine whether they could be considered as heritage sites. Map overlays were created showing the possible heritage sites identified within the areas of concern, as can be seen below (**Figure 17 to Figure 23**).

The relevant topographical maps include:

- Johannesburg 2628AA, Edition 2 (a reprint of Edition 1): which was surveyed in 1939 and drawn in 1945 by the Trigonometric Survey Office and reprinted in 1950.
- Johannesburg 2628AA, Edition 3: which was surveyed in 1954 and drawn in 1956 from air photography taken in 1952 by the Trigonometric Survey Office. This sheet was originally printed in 1956 (Edition 3) and reprinted republished in 1977 (as Edition 4).
- Johannesburg 2628AA, Edition 5: which was remapped in 1975 by the Director-General of Surveys and reprinted and published by the Government Printer in 1980.
- Johannesburg 2628AA, Edition 6: which was published by the Chief Directorate Surveys in 1983.

- Roodepoort 2627BB Edition 1, 1943: which was compiled and drawn by the Survey Depot South African Engineering Corps. (SAEC) and reprinted by the Government Printer in 1955
- Roodepoort 2627BB Edition 2, 1954: which was surveyed in 1954 and drawn in 1956 by the Trigonometric Survey Office from Air Photography in 1952. It was printed by the Government Printer in 1957.
- Roodepoort 2627BB Edition 3, 1977: which was remapped in 1977 by the Director-General of Surveys and printed by the Government Printer in 1979.
- Roodepoort 2627BB Edition 4, 1983: which was published by the Chief Directorate Surveys and Mapping in 1983.

It can be seen that all the map sheets consulted depict the entire project area surrounded by numerous built structures, including mine shafts and mine compounds, as well as mine slimes dams and sand dumps. Historical roads and railway lines are also depicted. Only those heritage structures that are situated within or immediately adjacent to the proposed project area have been highlighted by orange polygons. Many of these historical buildings, features and infrastructure belong to the original historical gold mines of Langlaagte Estates, Langlaagte Royal and Crown Mines, etc.

It should be noted that two declared heritage sites directly associated with the original mines are situated a short distance north of the proposed project area: the Main Reef Outcrop at the George Harrison Park and the Langlaagte Village. Both of these heritage sites are protected as formally declared provincial heritage sites.

Also important to note, is a cemetery that is depicted on the 1943 2627BB map as situated a short distance to the south of the proposed project area on the northern boundary of the Crown Mines golf course. This cemetery is depicted through all the map editions up to 1983. A single grave is also marked on the 1954 2627BB map in the area some distance north of the proposed study area, and west of a group of buildings that predates the formation of the suburb of Riverlea.

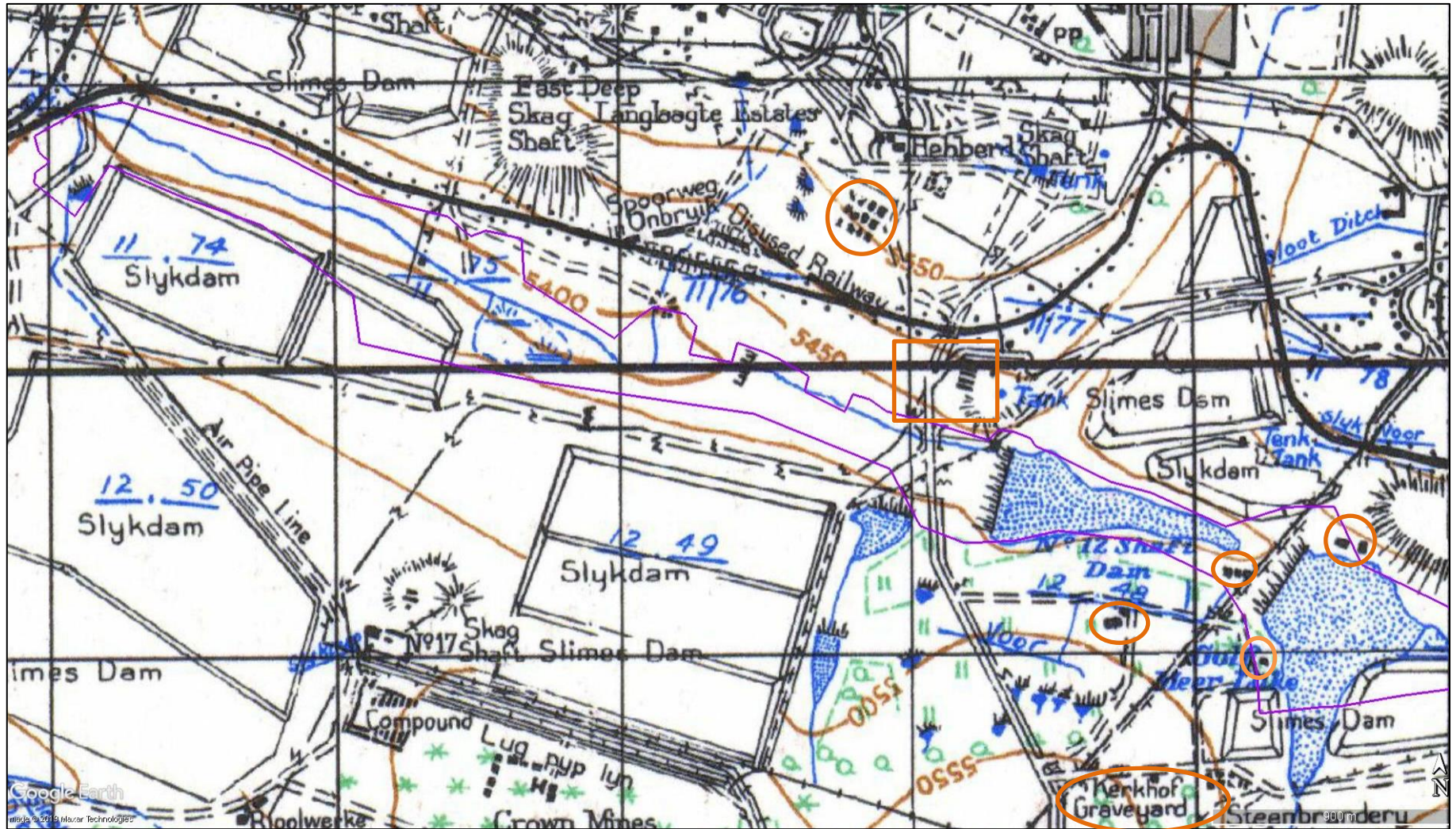


Figure 17 - 1st Edition 1943 Topographic Map (2627BB) showing the western section of the proposed study area (purple polygon) and the heritage sites in close proximity (orange polygons)

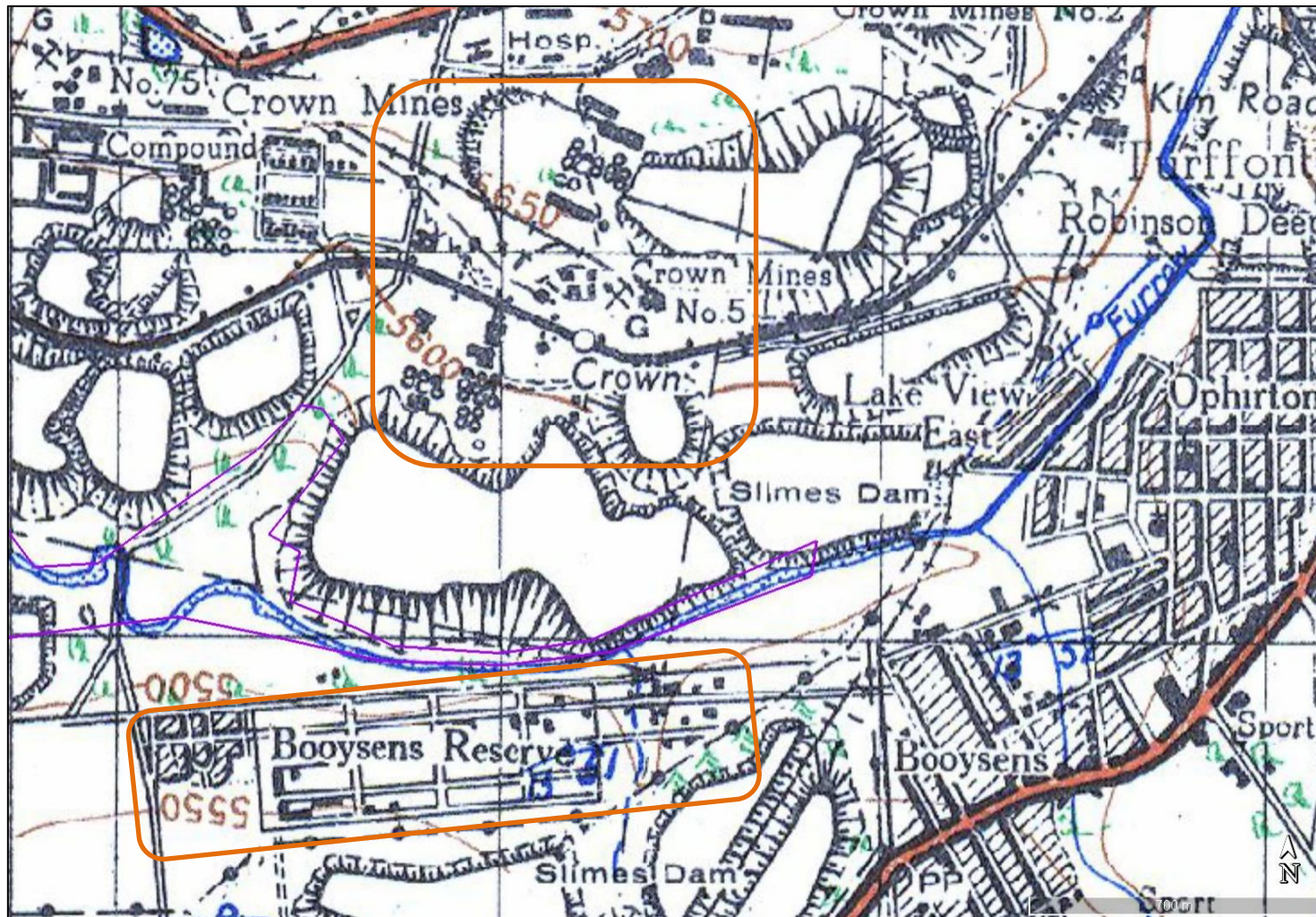


Figure 18 - 1st Edition 1939 Topographic Map (2628AA) showing eastern section of proposed study area (purple polygon) and the heritage sites in close proximity (orange polygons)

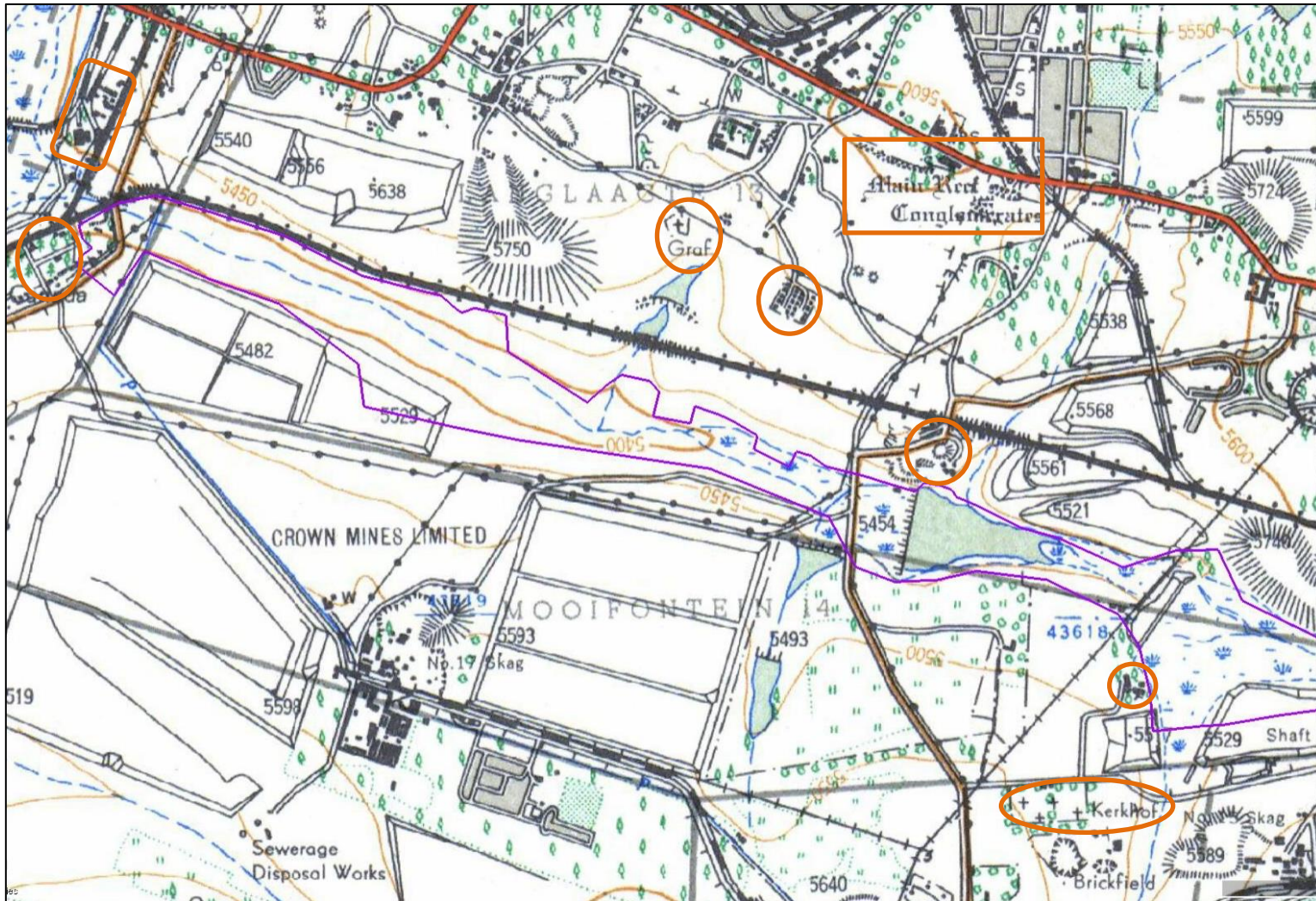


Figure 19 – Edition 1954 Topographic Map (2627BB) showing the western section of the proposed study area (purple polygon) and the heritage sites in close proximity (orange polygons)



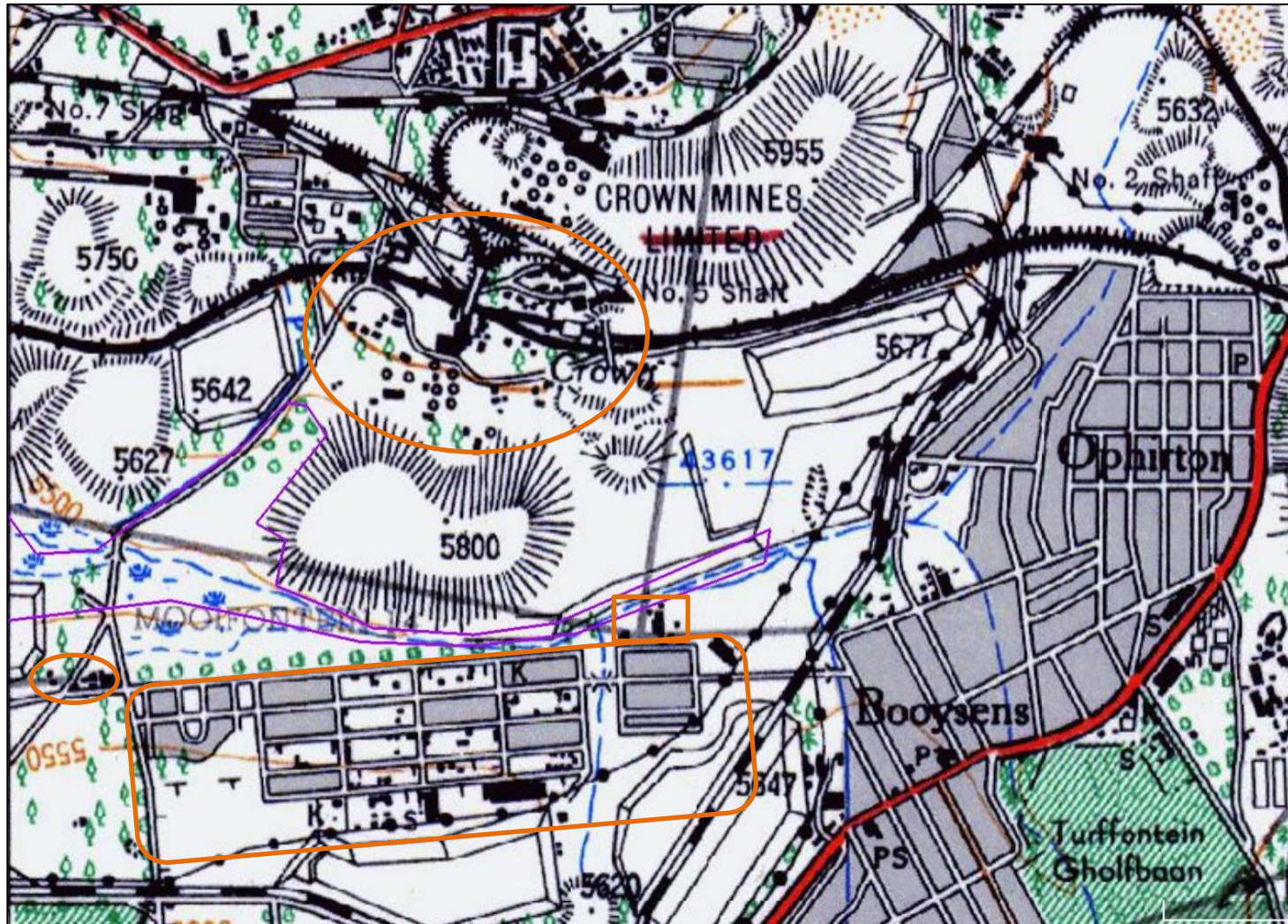


Figure 20 – Second Edition 1954 Topographic Map (2628AA) showing the eastern section of the proposed study area ( purple and pink polygons) and heritage sites in close proximity (orange polygons)



Figure 21 – 3rd Edition 1977 Topographic Map (2627BB) showing the western section of the proposed study area (purple polygons) and heritage sites in close proximity (orange polygons)

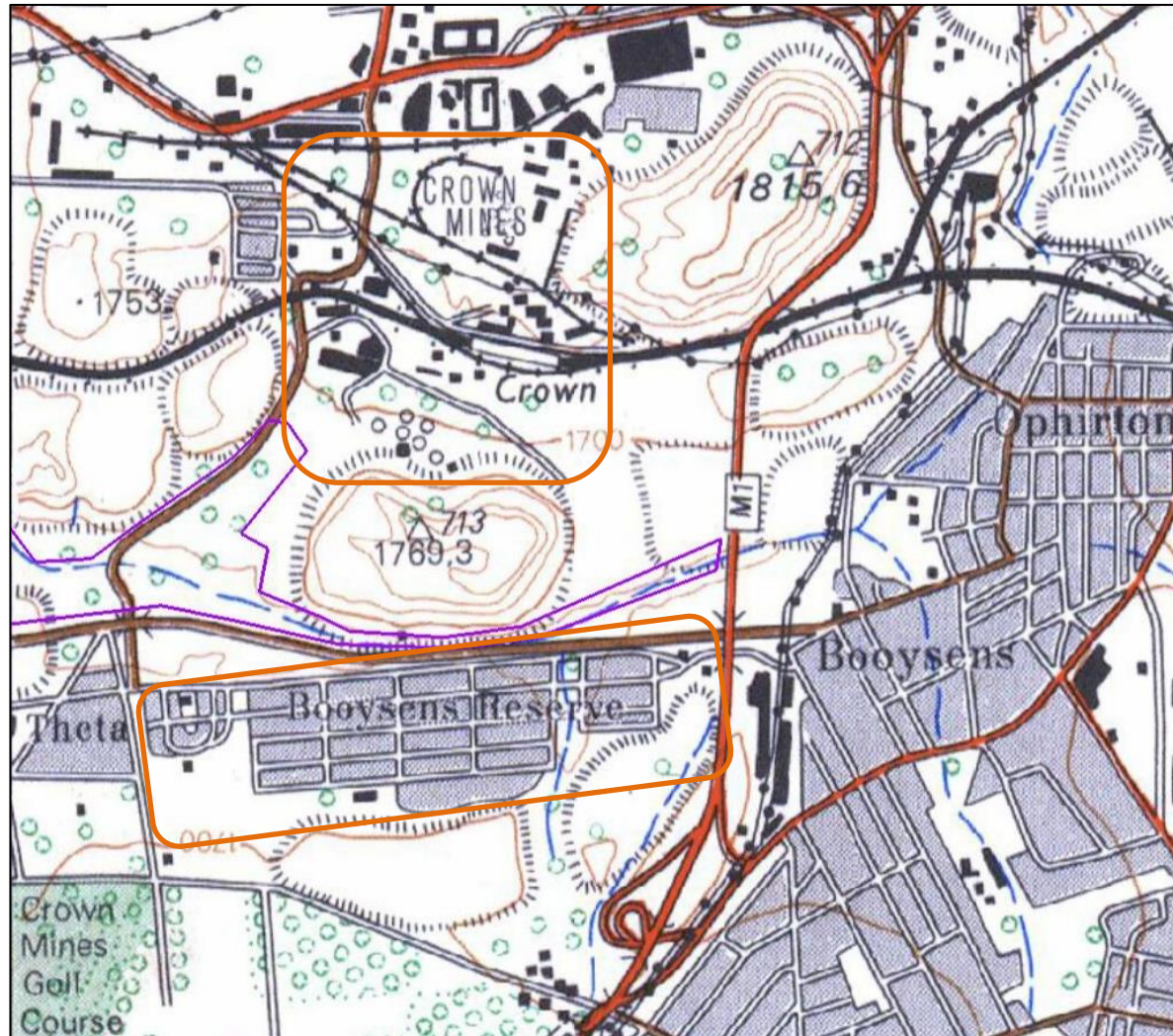


Figure 22 – 3rd Edition 1975 Topographic Map (2628AA) showing the eastern section of the proposed study area (purple polygons) and heritage sites in close proximity (orange polygons)



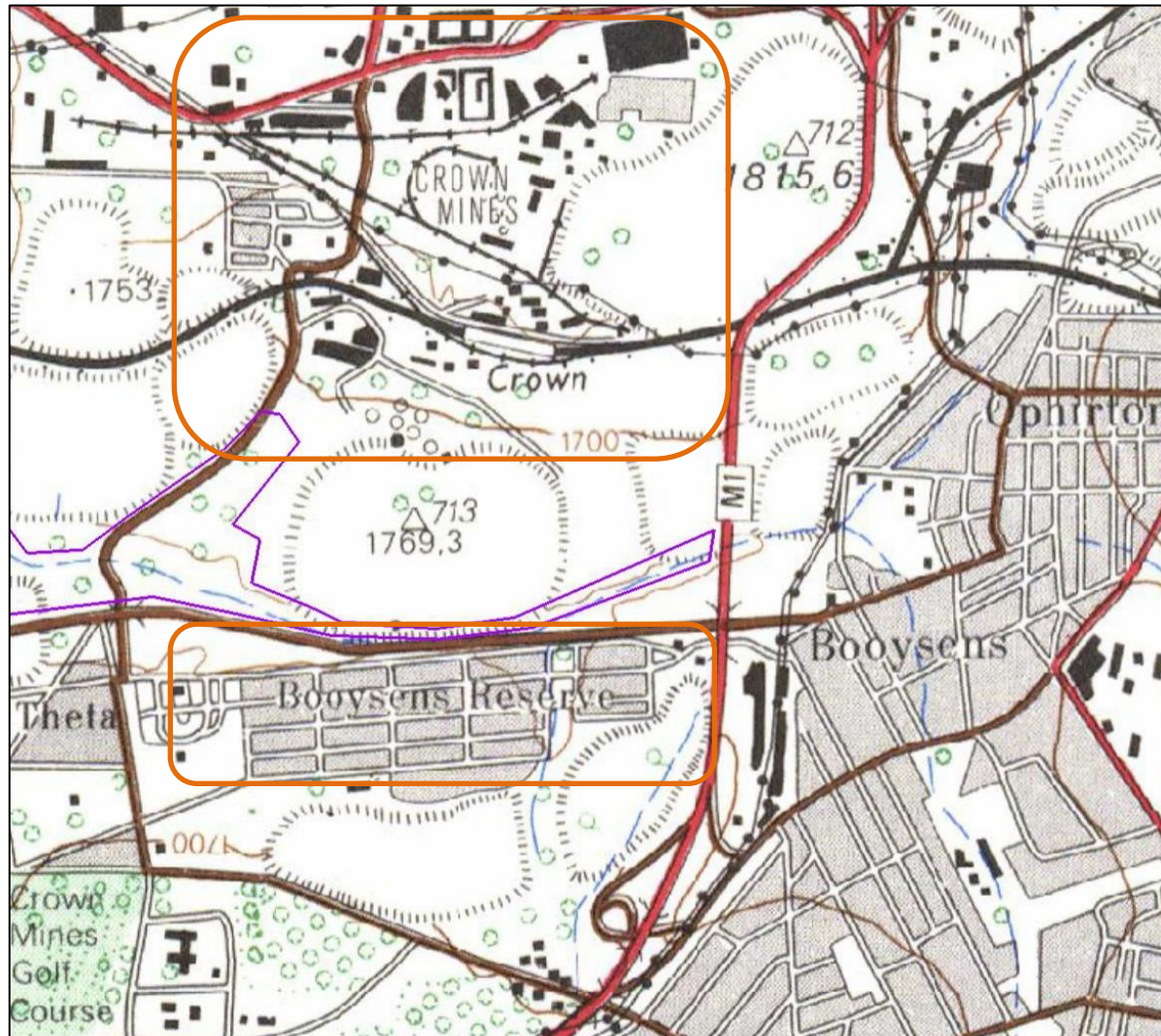


Figure 24 - Edition 1983 Topographic Map (2628AA) showing the eastern section of the proposed study area (purple polygons) and heritage sites in close proximity (orange polygons)

### 3.6 Findings of historical desktop study

The findings can be compiled as follows and have been combined to produce a heritage sensitivity map for the project based on the desktop assessment (Figure 25).

#### 3.6.1 Heritage Sensitivity

The sensitivity maps were produced by overlying:

- Satellite Imagery;
- Current Topographical Maps; and
- First to third edition Topographical Maps dating from the 1940's to 1970s.

This enabled the identification of possible heritage sensitive areas that included:

- Dwellings;
- Clusters of dwellings (homesteads and farmsteads);
- Archaeological Sensitive areas; and
- Structures/Buildings.

By superimposition and analysis, it was possible to rate these structure/areas according to age and thus their level of protection under the NHRA. Note that these structures refer to possible tangible heritage sites as listed in **Table 2**.

*Table 2 -Tangible heritage sites in the study area*

| Name                         | Description                  | Legislative protection |
|------------------------------|------------------------------|------------------------|
| Archaeology - Iron Age Sites | Older than 100 years         | NHRA Sect 3 and 35     |
| Architectural Structures     | Possibly older than 60 years | NHRA Sect 3 and 34     |
| Graves and Burial Grounds    | 60 years or older            | NHRA Sect 3 and 36     |

Additionally, evaluation of satellite imagery has indicated the following areas that may be sensitive from a heritage perspective. The analysis of the studies conducted in the area assisted in the development of the following landform type to heritage find matrix in **Table 3**.

*Table 3 - Landform type to heritage find matrix*

| LANDFORM TYPE              | HERITAGE TYPE  |
|----------------------------|--|
| Crest and foot hill        | LSA and MSA scatters, LIA settlements  |
| Crest of small hills       | Small LSA sites – scatters of stone artefacts, ostrich eggshell, pottery and beads |
| Watering holes/pans/rivers | LSA sites, LIA settlements   |
| Farmsteads                 | Historical archaeological material   |
| Ridges and drainage lines  | LSA sites, LIA settlements   |
| Forested areas             | LIA sites  |

# Valley Silts Rehabilitation Project Heritage Sensitivity Ratings

PGS Heritage (Pty) Ltd  
Heritage Management  
Unit



Figure 25 – Heritage sensitivity map indicating possible sensitive areas for Valley Silts area – Overview map.



## 4 FIELDWORK AND FINDINGS

A controlled surface survey was conducted on foot and by vehicle over a period of one day by one heritage specialist from PGS, together with the traffic engineer and accompanied by a security officer. The fieldwork was conducted on 14 October 2019. The track logs (in red) for the survey are indicated in **Figure 26**.

The two heritage resources were identified during the fieldwork component of this HIA are described in **Table 4** and their positions shown in **Figure 26**. One site is a historical structure or the remains of such structures (**VS1**). The other site identified is a burial ground (**VS2**).

# Valley Silts Rehabilitation Project Heritage Sites

PGS Heritage (Pty) Ltd  
Heritage Management  
Unit

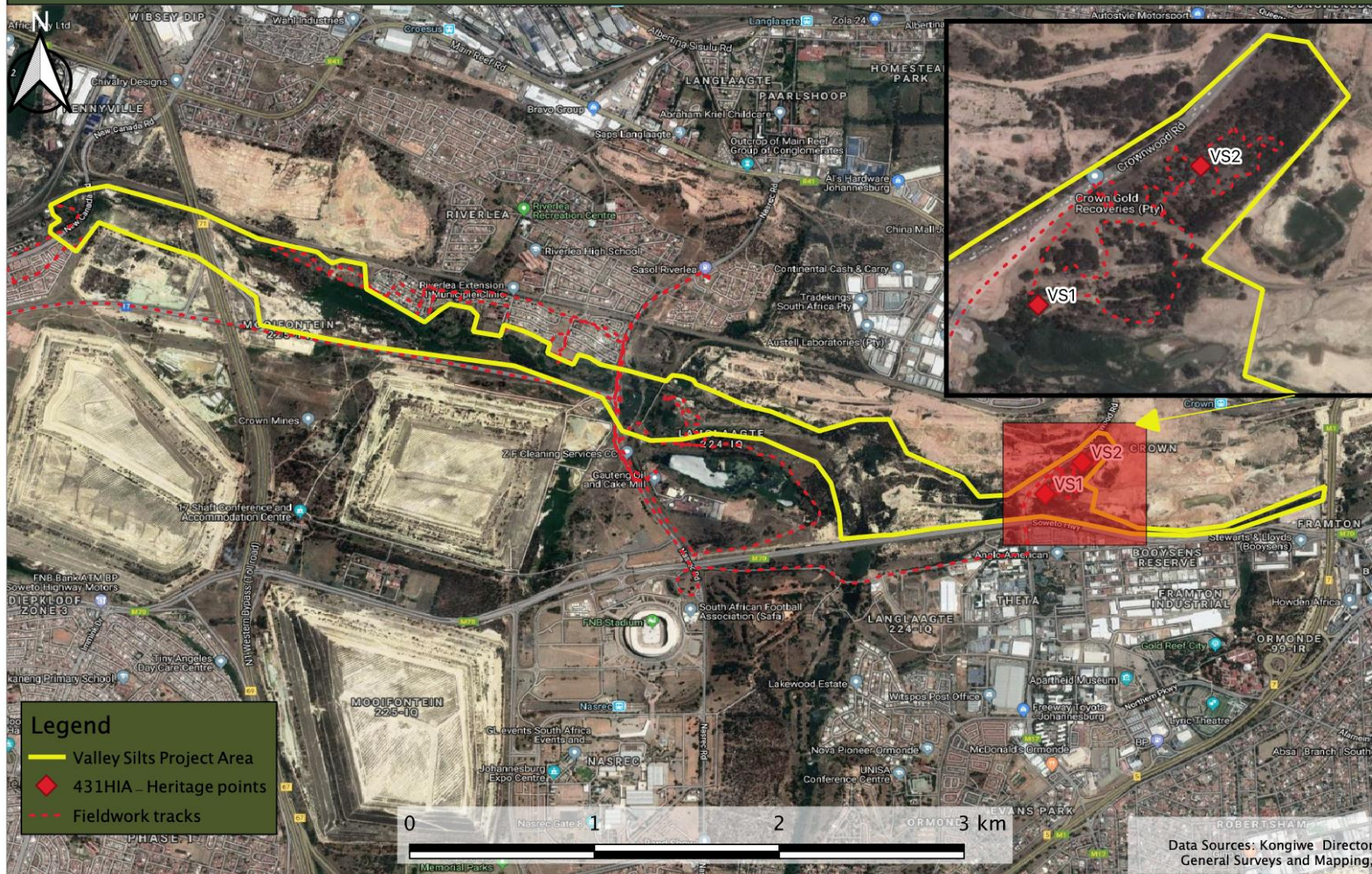


Figure 26 – Locality of the heritage resource in the study area

Table 4 - Sites identified during heritage survey

| Site <sup>1</sup><br>number | Lat      | Lon       | Description  | Heritage<br>Significance | Heritage<br>Rating |
|-----------------------------|----------|-----------|--|--------------------------|--------------------|
| VS1                         | S 26,227 | E 28,0040 | <p>The site consists of a semi exposed stone walled structure (partly covered with soil). The stone worked exposed consist of masoned stone blocks used to construct a stone wall. The structure is however not entirely exposed and determining the extent was impossible. Historical maps show no structures present in the area.</p> <p>It is evident that the wall is part of a larger subsurface structure and in all probability associated with early mining activities.</p> <p>The exposed section of the wall is approximately 10m in length.</p> <p>With the sparse information on the structure and the fact that very little has remained of structures related to the early mining history of the Witwatersrand this site can potentially hold further information on the history of the area. The site is provisionally rated as having a medium heritage significance with a heritage rating of IIIC.</p> <p>In the event that the site cannot be excluded from the planned mining activities, further research into the site must include:</p> <ul style="list-style-type: none"> <li>▪ Exposing the structure through archaeological excavation</li> <li>▪ Archival research on the structure</li> <li>▪ Analysis of any artefacts recovered during the excavations</li> <li>▪ If it is found that after mitigation the site is not conservation worthy an application for destruction must be lodged under s35 of the NHRA.</li> </ul> | Medium                   | Grade IIIC         |

<sup>1</sup> Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.

| Site <sup>1</sup><br>number | Lat | Lon | Description  | Heritage<br>Significance | Heritage<br>Rating |
|-----------------------------|-----|-----|--|--------------------------|--------------------|
|                             |     |     | <ul style="list-style-type: none"> <li data-bbox="815 236 1615 352">▪ If the site is to be retained after mitigation a site-specific heritage management plan for the site must be developed and submitted for approval to the SAHRA.</li> </ul> |                          |                    |



*Figure 27 – Exposed stone walling at VS1*

| Site <sup>1</sup><br>number | Lat      | Lon       | Description  | Heritage<br>Significance | Heritage<br>Rating |
|-----------------------------|----------|-----------|--|--------------------------|--------------------|
| VS2                         | S 26,226 | E 28,0060 | <p>The cemetery is situated between Crownwood road and the reclaimed Crown Mine dump. Numerous stone packed graves were identified during the fieldwork. Due to the vegetation growth it was impossible to do an accurate grave count, but an estimated 50-100 graves are located in the area. My discussions with the archaeologist, Anton Pelser, who was responsible for the grave relocations at Crown Mines, indicated that the cemetery may be related to Indian labourers. This is however hearsay.</p> <p><b>The extent is approx. 1ha</b></p> <p>The age of the cemetery is difficult to estimate. Some of the graves do have large eucalyptus trees growing on them. The locality in relation to the grave relocated just to the east of this cemetery as well as the possibility of the graves linked to indentured labour indicates the site is of high heritage significance and a grading of IIIA.</p> <p>It is recommended that the area is avoided and demarcated as a cemetery with a 50 meter buffer</p> | High                     | IIIA               |



| Site <sup>1</sup><br>number | Lat | Lon | Description  | Heritage<br>Significance | Heritage<br>Rating  |
|-----------------------------|-----|-----|--|--------------------------|---|
|                             |     |     |  |                          |   |
|                             |     |     |  |                          |  |

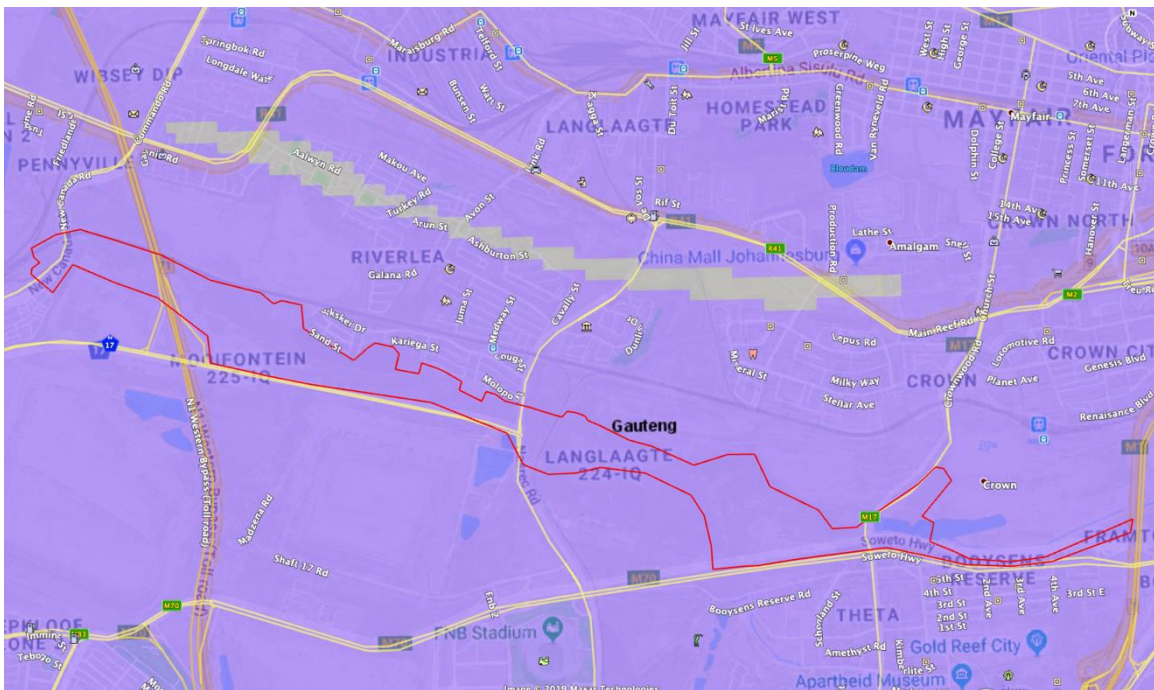
Figure 28 – Stone packed graves in the cemetery

Figure 29 – Trees growing on some graves

## 5 PALAEOLOGY

The Proposed Project is underlain by the Turffontein and Johannesburg Subgroups, which are rated as Low to Zero Palaeontological Sensitivity on the SAHRIS palaeosensitivity map. These subgroups generally consist of quartzites and conglomerates formed by braided river systems, as well as pyritic sands, insignificant shales, and volcanics as well as debris-flow diamictites. Rock formations with a zero palaeontological sensitivity are unfossiliferous (Kongiwe 2019).

A basic palaeontological sensitivity was determined using the palaeosensitivity map on the SAHRIS database (South African Heritage Resources Information System) (<http://www.sahra.org.za/sahris/map/palaeo>). As can be seen in **Figure 30**, the proposed area of the project footprint occurs in an area where the palaeontology is assessed as being entirely of Low sensitivity (coloured blue) and no palaeontological studies are required. Since it is anticipated that there should be no excavation into the underlying geology and the area surrounding the dumps has been disturbed extensively in the past, it is recommended that an application for exemption from the standard requirement for a Palaeontological Impact Assessment be made to SAHRA.



*Figure 30 – Overlay of the Valley Silts area on the palaeosensitivity map from the SAHRIS database. This shows that most of the area is coloured blue, which is rated as Low sensitivity*

| Colour        | Sensitivity        | Required Action   |
|---------------|--------------------|---|
| RED           | VERY HIGH          | field assessment and protocol for finds is required   |
| ORANGE/YELLOW | HIGH               | desktop study is required and based on the outcome of the desktop study, a field assessment is likely                               |
| GREEN         | MODERATE           | desktop study is required   |
| BLUE          | LOW                | no palaeontological studies are required however a protocol for finds is required   |
| GREY          | INSIGNIFICANT/ZERO | no palaeontological studies are required  |
| WHITE/CLEAR   | UNKNOWN            | these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map. |

Figure 31 - SAHRIS palaeosensitivity ratings table

## 6 IMPACT ASSESSMENT

The following section provides the impact of the proposed development on identified heritage resources.

### 6.1 Methodology for determining the Significance of Environmental Impacts

This part of the document focuses on the identification of the major potential impacts the activities, processes and actions may have on the surrounding environment.

The impact significance rating process serves two purposes: firstly, it helps to highlight the critical impacts requiring consideration in the management and approval process; secondly, it shows the primary impact characteristics, as defined above, used to evaluate impact significance.

The impact significance rating system is presented in **Table 5** and involves three parts:

- **Part A:** Define impact consequence using the three primary impact characteristics of magnitude, spatial scale/ population and duration;
- **Part B:** Use the matrix to determine a rating for impact consequence based on the definitions identified in Part A; and
- **Part C:** Use the matrix to determine the impact significance rating, which is a function of the impact consequence rating (from **Part B**) and the probability of occurrence.



Table 5 - Impact significance rating system

| <b>PART A: DEFINING CONSEQUENCE IN TERMS OF MAGNITUDE, DURATION AND SPATIAL SCALE</b><br><i>Use these definitions to define the consequence in Part B</i> |                         |   |          |                         |        |
|---|-------------------------|---|----------|-------------------------|--------|
| Impact characteristics  | Definition              | Criteria  |          |                         |        |
| <b>MAGNITUDE</b>  | Major -                 | Substantial deterioration or harm to receptors; receiving environment has an inherent value to stakeholders; receptors of impact are of conservation importance; or identified threshold often exceeded |          |                         |        |
|   | Moderate -              | Moderate/measurable deterioration or harm to receptors; receiving environment moderately sensitive; or identified threshold occasionally exceeded   |          |                         |        |
|   | Minor -                 | Minor deterioration (nuisance or minor deterioration) or harm to receptors; change to receiving environment not measurable; or identified threshold never exceeded                                      |          |                         |        |
|   | Minor +                 | Minor improvement; change not measurable; or threshold never exceeded   |          |                         |        |
|   | Moderate +              | Moderate improvement; within or better than the threshold; or no observed reaction  |          |                         |        |
|   | Major +                 | Substantial improvement; within or better than the threshold; or favourable publicity   |          |                         |        |
| <b>SPATIAL SCALE OR POPULATION</b>  | Site or local           | Site specific or confined to the immediate project area   |          |                         |        |
|   | Regional                | May be defined in various ways, e.g. cadastral, catchment, topographic  |          |                         |        |
|   | National/ International | Nationally or beyond  |          |                         |        |
| <b>DURATION</b>   | Short term              | Up to 18 months.  |          |                         |        |
|   | Medium term             | 18 months to 5 years  |          |                         |        |
|   | Long term               | Longer than 5 years   |          |                         |        |
| <b>PART B: DETERMINING CONSEQUENCE RATING</b><br><i>Rate consequence based on definition of magnitude, spatial extent and duration</i>                    |                         |   |          |                         |        |
|   |                         | <b>SPATIAL SCALE/ POPULATION</b>  |          |                         |        |
|   |                         | Site or Local   | Regional | National/ international |        |
| <b>MAGNITUDE</b>  |                         |   |          |                         |        |
| <b>Minor</b>  | <b>DURATION</b>         | <b>Long term</b>  | Medium   | Medium                  | High   |
|   |                         | <b>Medium term</b>  | Low      | Low                     | Medium |
|   |                         | <b>Short term</b>   | Low      | Low                     | Medium |
| <b>Moderate</b>   | <b>DURATION</b>         | <b>Long term</b>  | Medium   | High                    | High   |
|   |                         | <b>Medium term</b>  | Medium   | Medium                  | High   |
|   |                         | <b>Short term</b>   | Low      | Medium                  | Medium |
| <b>Major</b>  | <b>DURATION</b>         | <b>Long term</b>  | High     | High                    | High   |
|   |                         | <b>Medium term</b>  | Medium   | Medium                  | High   |
|   |                         | <b>Short term</b>   | Medium   | Medium                  | High   |
| <b>PART C: DETERMINING SIGNIFICANCE RATING</b><br><i>Rate significance based on consequence and probability</i>   |                         |   |          |                         |        |
|   |                         | <b>CONSEQUENCE</b>  |          |                         |        |
|   |                         | Low   | Medium   | High                    |        |
| <b>PROBABILITY (of exposure to impacts)</b>   | <b>Definite</b>         | Medium  | Medium   | High                    |        |
|   | <b>Possible</b>         | Low   | Medium   | High                    |        |
|   | <b>Unlikely</b>         | Low   | Low      | Medium                  |        |

## 6.2 Heritage Impacts

### 6.2.1 Heritage Sites in the vicinity of Valley Silts areas

The fieldwork identified two heritage features (**VS1** and **VS2**). **VS1** is a partly exposed stone structure probably related to early mining history, while **VS2** is a cemetery with approximately 50-100 visible graves.

### 6.2.2 Historical structures

**VS1** has a medium heritage significance with a heritage grading of IIIB.

The impact significance before mitigation on the historical structures will be **Medium** negative before mitigation. Implementation of the recommended mitigation measures will modify this impact rating to an acceptable LOW negative.

### 6.2.3 Burial Grounds and graves

The cemetery at **VS2** has a high heritage rating and a heritage grading of IIIA.

The impact significance before mitigation on the cemetery and graves sites will be High negative before mitigation. Implementation of the recommended mitigation measures will modify this impact rating to an acceptable Medium to Low negative.

It should be noted that, in addition to the large informal burial ground (**VS2**) identified during the fieldwork for this project, several unmarked burial grounds have been identified and uncovered by previous development and construction projects in the surrounding area (i.e. two at Fleurhof and one at Stormill in the West Rand). In addition, an example of a burial ground that had been covered by a slimes dam/sand dump and was exposed after the dump had been reclaimed is known from the Crown Mines/ Langlaagte area in Johannesburg (Anton Pelsler 2012 and pers.comm.; Esterhuysen *et al* 2018).

The communities of Riverlea have also indicated that the possibility of graves in the areas just below Riverlea does exist even though fieldwork has revealed no evidence of this.

## 6.3 Palaeontological Impacts

As noted in Section 5 above, the Valley Silts occur in an area where the palaeontology is assessed as being almost entirely of Low sensitivity (coloured blue) and no palaeontological studies are required. Since it is anticipated that there should be no excavation into the underlying geology and the area surrounding the dumps has been disturbed extensively in the past, it is recommended that an application for exemption from the standard requirement for a Palaeontological Impact Assessment be made to SAHRA.

## 6.4 Impact Assessment Table

Table 6 - Impact Assessment Table

| N o. | Affected Environment       | Activity                | Impact Description             | BEFORE MITIGATION |                     |               |             |             | Cumulative Impact | Mitigation measures / Recommendations | AFTER MITIGATION                  |           |                        |               |             |             |              |
|------|----------------------------|-------------------------|--------------------------------|-------------------|---------------------|---------------|-------------|-------------|-------------------|---------------------------------------|-----------------------------------|-----------|------------------------|---------------|-------------|-------------|--------------|
|      |                            |                         |                                | Magnitude         | Duration            | Spatial Scale | Consequence | Probability |                   |                                       | SIGNIFICANCE                      | Magnitude | Duration               | Spatial Scale | Consequence | Probability | SIGNIFICANCE |
|      | <b>Construction</b>        |                         |                                |                   |                     |               |             |             |                   |                                       |                                   |           |                        |               |             |             |              |
| 1    | Historical structure - VS1 | Desilting / Reclamation | Destruction of stone structure | Mode rate -       | Long Term > 5 years | Site or Local | Medium      | Possible    | Medium            | No                                    | Demarcate as no-go                | Minor +   | Short Term < 18 months | Site or Local | Low         | Minor +     | Medium       |
| 2    | Cemetery - VS2             | Desilting / Reclamation | Destruction of graves          | Major -           | Long Term > 5 years | Site or Local | High        | Possible    | High              | No                                    | Demarcate as no-go                | Minor +   | Short Term < 18 months | Site or Local | Low         | Minor +     | Medium       |
| 3    | Possible burials           | Desilting / Reclamation | Destruction of graves          | Major -           | Long Term > 5 years | Site or Local | High        | Possible    | High              | No                                    | Implement chance finds procedures | Minor -   | Long Term > 5 years    | Site or Local | Medium      | Possible    | Medium       |

## 6.5 Management recommendations and guidelines

### 6.5.1 Construction phase

The project will encompass a range of activities during the construction phase, including ground clearance, establishment of construction camp areas and small-scale infrastructure development associated with the project.

It is possible that cultural material will be exposed during construction and may be recoverable, keeping in mind delays can be costly during construction and as such must be minimised. Development surrounding infrastructure and construction of facilities results in significant disturbance, however foundation holes do offer a window into the past and it thus may be possible to rescue some of the data and materials. It is also possible that substantial alterations will be implemented during this phase of the project and these must be catered for. Temporary infrastructure developments, such as construction camps and laydown areas, are often changed or added to the project as required. In general, these are low impact developments as they are superficial, resulting in little alteration of the land surface, but still need to be catered for.

During the construction phase, it is important to recognize any significant material being unearthed, making the correct judgment on which actions should be taken. It is recommended that the following chance find procedure should be implemented.

### 6.5.2 Chance find procedure

- A heritage practitioner / archaeologist should be appointed to develop a heritage induction program and conduct training for the ECO as well as team leaders in the identification of heritage resources and artefacts.
- An appropriately qualified heritage practitioner / archaeologist must be identified to be called upon in the event that any possible heritage resources or artefacts are identified.
- Should an archaeological site or cultural material be discovered during construction (or operation), the area should be demarcated and construction activities halted.
- The qualified heritage practitioner / archaeologist will then need to come out to the site and evaluate the extent and importance of the heritage resources and make the necessary recommendations for mitigating the find and the impact on the heritage resource.
- The contractor therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the materials and data are recovered.
- Construction can commence as soon as the site has been cleared and signed off by the heritage practitioner / archaeologist.

### 6.5.3 Possible finds during construction and operation (desilting activities)

The study area occurs within a greater historical and archaeological site as identified during the desktop and fieldwork phase. Soil clearance for infrastructure as well as the proposed reclamation activities, could uncover the following:

- stone foundations;
- ash middens associated with the historical structures that can contain bone, glass and clay ceramics, ash, metal objects such as spoons, forks, and knives.
- unmarked graves

### 6.6 Timeframes

It must be kept in mind that mitigation and monitoring of heritage resources discovered during construction activity will require permitting for collection or excavation of heritage resources and lead times must be worked into the construction time frames. **Table 7** gives guidelines for lead times on permitting.

*Table 7 - Lead times for permitting and mobilisation*

| <b>Action</b>  | <b>Responsibility</b>   | <b>Timeframe</b> |
|--|---|------------------|
| Preparation for field monitoring and finalisation of contracts           | The contractor and service provider   | 1 month          |
| Application for permits to do necessary mitigation work                  | Service provider – Archaeologist and SAHRA  | 3 months         |
| Documentation, excavation and archaeological report on the relevant site | Service provider – Archaeologist  | 3 months         |
| Handling of chance finds – Graves/Human Remains                          | Service provider – Archaeologist and SAHRA  | 2 weeks          |
| Relocation of burial grounds or graves in the way of construction        | Service provider – Archaeologist, SAHRA, local government and provincial government | 6 months         |

## 6.7 Heritage Management Plan for EMPr implementation

Table 8 - Heritage Management Plan for EMPr implementation

| Area and site no.                 | Mitigation measures   | Phase                             | Timeframe                         | Responsible party for implementation | Monitoring Party (frequency)        | Target  | Performance indicators (monitoring tool) |
|-----------------------------------|---|-----------------------------------|-----------------------------------|--------------------------------------|-------------------------------------|---|--|
| <b>General project area</b>       | Implement chance find procedures in case where possible heritage finds are uncovered  | Construction and operation        | During construction and operation | Applicant ECO Heritage Specialist    | ECO (monthly / as or when required) | Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34, 35,36 and 38 of NHRA | ECO Monthly Checklist/Report             |
| <b>VS1 – historical structure</b> | <p>In the event that the site cannot be excluded from the planned activities, further research into the site must include:</p> <ul style="list-style-type: none"> <li>▪ Exposing the structure through archaeological excavation</li> <li>▪ Archival research on the structure</li> <li>▪ Analysis of any artefacts recovered during the excavations</li> <li>▪ If it is found that after mitigation the site is not conservation worthy an application for destruction must be lodged under s35 of the NHRA.</li> <li>▪ If the site is to be retained after mitigation a site-specific heritage management plan for</li> </ul> | Construction through to operation | Prior to and during construction  | Applicant ECO                        | Applicant ECO                       | Ensure compliance with relevant legislation and recommendations from SAHRA under a35 nd 38 of NHRA                | ECO Monthly Checklist/Report             |

| Area and site no.                 | Mitigation measures  | Phase                               | Timeframe                         | Responsible party for implementation          | Monitoring Party (frequency) | Target   | Performance indicators (monitoring tool) |
|-----------------------------------|--|-------------------------------------|-----------------------------------|---|------------------------------|--|--|
|                                   | the site must be developed and submitted for approval to the SAHRA.  |                                     |                                   |   |                              |  |  |
| <b>VS2 informal burial ground</b> | Demarcate site with a 50m buffer and avoid.  | Construction through to Operational | Prior to and during construction  | Applicant ECO Heritage specialist             | Applicant ECO                | Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA | ECO Monthly Checklist/Report             |
| <b>Possible graves</b>            | Undertake archaeological monitoring at earth clearance stage<br>If any human remains are uncovered, contact SAHRA and appoint a qualified heritage specialist to undertake appropriate mitigation (usually exhumation and relocation). | Construction through to Operational | During Construction and Operation | Applicant Environmental Control Officer (ECO) | Applicant ECO                | Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA | ECO Monthly Checklist/Report             |

## 7 CONCLUSIONS

The HIA has shown that the study area and surrounding area has some heritage resources situated within the proposed development boundaries. Through data analysis and a site investigation the following issues were identified from a heritage perspective.

### Heritage Sites

The fieldwork identified two heritage features (**VS1** and **VS2**). **VS1** is a partly exposed stone structure probably related to early mining history, while **VS2** is a cemetery with approximately 50 visible graves.

#### *Historical structures*

**VS1** has a medium heritage significance with a heritage grading of IIIB.

The impact significance before mitigation on the historical structures will be **Medium** negative before mitigation. Implementation of the recommended mitigation measures will modify this impact rating to an acceptable LOW negative.

#### *Burial Grounds and graves*

The cemetery at **VS2** has a high heritage rating and a heritage grading of IIIA.

The impact significance before mitigation on the cemetery and graves sites will be High negative before mitigation. Implementation of the recommended mitigation measures will modify this impact rating to an acceptable Medium to Low negative.

It should be noted that, in addition to the large informal burial ground (**VS2**) identified during the fieldwork for this project, several unmarked burial grounds have been identified and uncovered by previous development and construction projects in the surrounding area (i.e. two at Fleurhof and one at Stormill). In addition, an example of a burial ground that had been covered by a slimes dam/sand dump and was exposed after the dump had been reclaimed is known from the Crown Mines/ Langlaagte area in Johannesburg (Anton Pelsler 2012 and pers.comm.; Esterhuysen *et al* 2018).

The communities of Riverlea have also indicated that the possibility of graves in the areas just below Riverlea does exist even though fieldwork has revealed no evidence of this.

### Palaeontology

As noted in Section 5 above, the Valley Silts occur in an area where the palaeontology is assessed as being almost entirely of Low sensitivity (coloured blue) and no palaeontological studies are required. Since it is anticipated that there should be no excavation into the underlying geology and the area surrounding the dumps has been disturbed extensively in the past, it is recommended that



an application for exemption from the standard requirement for a Palaeontological Impact Assessment be made to SAHRA.

### General

It is the author's considered opinion that overall impact on heritage resources is Medium to Low. Provided that the recommended mitigation measures are implemented, the impact would be acceptably low or could be totally mitigated to the degree that the project could be approved from a heritage perspective. The management and mitigation measures as described in Section 6 of this report have been developed to minimise the project impact on heritage resources

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## Heritage Assessment Methodology

The applicable maps, tables and figures, are included as stipulated in the NHRA (no 25 of 1999), the NEMA (no 107 of 1998). The HIA process consisted of three steps:

Step I – Literature Review: The background information to the field survey relies greatly on the Heritage Background Research.

Step II – Physical Survey: A physical survey was conducted by vehicle through the proposed project area by a qualified heritage specialist. The survey was conducted over one day (21 August 2019), aimed at locating and documenting sites falling within and adjacent to the proposed development footprint.

Step III – The final step involved the recording and documentation of relevant archaeological resources, the assessment of resources in terms of the HIA criteria and report writing, as well as mapping and constructive recommendations.

The significance of heritage sites was based on four main criteria:

- Site integrity (i.e. primary vs. secondary context),
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures),
- Density of scatter (dispersed scatter)
  - Low - <10/50m<sup>2</sup>
  - Medium - 10-50/50m<sup>2</sup>
  - High - >50/50m<sup>2</sup>
- Uniqueness; and
- Potential to answer present research questions.

Management actions and recommended mitigation, which will result in a reduction in the impact on the sites, will be expressed as follows:

A - No further action necessary;

B - Mapping of the site and controlled sampling required;

C - No-go or relocate development activity position;

D - Preserve site, or extensive data collection and mapping of the site; and

E - Preserve site.

Impacts on these sites by the development will be evaluated as follows:

## Site Significance

Site significance classification standards use is based on the heritage classification of s3 in the NHRA and developed for implementation keeping in mind the grading system approved by SAHRA for archaeological impact assessments. The update classification and rating system as developed by Heritage Western Cape (2016) is implemented in this report.

Site significance classification standards prescribed by the Heritage Western Cape Guideline (2016), were used for the purpose of this report.

Table A 1: Rating system for archaeological resources

| Grading | Description of Resource  | Examples of Possible Management Strategies  | Heritage Significance                                |
|---------|--|---|--|
| I       | Heritage resources with qualities so exceptional that they are of special national significance.<br>Current examples: Langebaanweg (West Coast Fossil Park), Cradle of Humankind   | May be declared as a National Heritage Site managed by SAHRA. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.                    | Highest Significance                                 |
| II      | Heritage resources with special qualities which make them significant, but do not fulfil the criteria for Grade I status.<br>Current examples: Blombos, Paternoster Midden.  | May be declared as a Provincial Heritage Site managed by HWC. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.                    | Exceptionally High Significance                      |
| III     | Heritage resources that contribute to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register. |   |  |
| IIIA    | Such a resource must be an excellent example of its kind or must be sufficiently rare.<br>Current examples: Varschedrift; Peers Cave; Brobartia Road Midden at Bettys Bay  | Resource must be retained. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.   | High Significance                                    |
| IIIB    | Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree.   | Resource must be retained where possible where not possible it must be fully investigated and/or mitigated.   | Medium Significance                                  |
| IIIC    | Such a resource is of contributing significance.   | Resource must be satisfactorily studied before impact. If the recording already done (such as in an HIA or permit application) is not sufficient, further recording or even mitigation may be required. | Low Significance                                     |
| NCW     | A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.  | No further actions under the NHRA are required. This must be motivated by the applicant or the consultant and approved by the authority.  | No research potential or other cultural significance |

Table A 2: Rating system for built environment resources

| Grading | Description of Resource   | Examples of Possible Management Strategies   | Heritage Significance           |
|---------|---|--|---------------------------------|
| I       | Heritage resources with qualities so exceptional that they are of special national significance.<br>Current examples: Robben Island   | May be declared as a National Heritage Site managed by SAHRA.  | Highest Significance            |
| II      | Heritage resources with special qualities which make them significant in the context of a province or region, but do not fulfil the criteria for Grade I status.<br>Current examples: St George's Cathedral, Community House  | May be declared as a Provincial Heritage Site managed by HWC.  | Exceptionally High Significance |
| II      | Such a resource contributes to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register. |  |                                 |
| IIIA    | Such a resource must be an excellent example of its kind or must be sufficiently rare.<br>These are heritage resources which are significant in the context of an area.   | This grading is applied to buildings and sites that have sufficient intrinsic significance to be regarded as local heritage resources; and are significant enough to warrant that any alteration, both internal and external, is regulated. Such buildings and sites may be representative, being excellent examples of their kind, or may be rare. In either case, they should receive maximum protection at local level. | High Significance               |
| IIIB    | Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree.<br>These are heritage resources which are significant in the context of a townscape, neighbourhood, settlement or community.   | Like Grade IIIA buildings and sites, such buildings and sites may be representative, being excellent examples of their kind, or may be rare, but less so than Grade IIIA examples. They would receive less stringent protection than Grade IIIA buildings and sites at local level.  | Medium Significance             |
| IIIC    | Such a resource is of contributing significance to the environs<br>These are heritage resources which are significant in the context of a streetscape or direct neighborhood.   | This grading is applied to buildings and/or sites whose significance is contextual, i.e. in large part due to its contribution to the character or significance of the environs.<br>These buildings and sites should, as a consequence, only be regulated if the significance of the environs is sufficient to warrant protective measures,  | Low Significance                |

| Grading | Description of Resource   | Examples of Possible Management Strategies   | Heritage Significance                                |
|---------|---|--|--|
|         |   | regardless of whether the site falls within a Conservation or Heritage Area. Internal alterations should not necessarily be regulated.   |  |
| NCW     | A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate. | No further actions under the NHRA are required. This must be motivated by the applicant and approved by the authority. Section 34 can even be lifted by HWC for structures in this category if they are older than 60 years. | No research potential or other cultural significance |

***The Significance Rating Scales for the Proposed Prospecting Activities on Heritage Resources***

The impact significance rating process serves two purposes: firstly, it helps to highlight the critical impacts requiring consideration in the management and approval process; secondly, it shows the primary impact characteristics, as defined above, used to evaluate impact significance.

The impacts will be ranked according to the methodology described below. Where possible, mitigation measures will be provided to manage impacts. In order to ensure uniformity, a standard impact assessment methodology will be utilised so that a wide range of impacts can be compared with each other. The impact assessment methodology makes provision for the assessment of impacts against the following criteria:

Significance;  
Spatial scale;  
Temporal scale;  
Probability; and  
Degree of certainty.

A combined quantitative and qualitative methodology was used to describe impacts for each of the aforementioned assessment criteria. A summary of each of the qualitative descriptors along with the equivalent quantitative rating scale for each of the aforementioned criteria is given in **(Table A 3)**

**Part A:** Define impact consequence using the three primary impact characteristics of magnitude, spatial scale/ population and duration;

**Part B:** Use the matrix to determine a rating for impact consequence based on the definitions identified in Part A; and

**Part C:** Use the matrix to determine the impact significance rating, which is a function of the impact consequence rating (from **Part B**) and the probability of occurrence.

*Table A 3 - Significance Rating Methodology*

| <b>PART A: DEFINING CONSEQUENCE IN TERMS OF MAGNITUDE, DURATION AND SPATIAL SCALE</b><br><i>Use these definitions to define the consequence in Part B</i> |                         |   |                 |                                |        |
|---|-------------------------|---|-----------------|--------------------------------|--------|
| <b>Impact characteristics</b>   | <b>Definition</b>       | <b>Criteria</b>   |                 |                                |        |
| <b>MAGNITUDE</b>  | Major -                 | Substantial deterioration or harm to receptors; receiving environment has an inherent value to stakeholders; receptors of impact are of conservation importance; or identified threshold often exceeded |                 |                                |        |
|   | Moderate -              | Moderate/measurable deterioration or harm to receptors; receiving environment moderately sensitive; or identified threshold occasionally exceeded   |                 |                                |        |
|   | Minor -                 | Minor deterioration (nuisance or minor deterioration) or harm to receptors; change to receiving environment not measurable; or identified threshold never exceeded                                      |                 |                                |        |
|   | Minor +                 | Minor improvement; change not measurable; or threshold never exceeded   |                 |                                |        |
|   | Moderate +              | Moderate improvement; within or better than the threshold; or no observed reaction  |                 |                                |        |
|   | Major +                 | Substantial improvement; within or better than the threshold; or favourable publicity   |                 |                                |        |
| <b>SPATIAL SCALE OR POPULATION</b>  | Site or local           | Site specific or confined to the immediate project area   |                 |                                |        |
|   | Regional                | May be defined in various ways, e.g. cadastral, catchment, topographic  |                 |                                |        |
|   | National/ International | Nationally or beyond  |                 |                                |        |
| <b>DURATION</b>   | Short term              | Up to 18 months.  |                 |                                |        |
|   | Medium term             | 18 months to 5 years  |                 |                                |        |
|   | Long term               | Longer than 5 years   |                 |                                |        |
| <b>PART B: DETERMINING CONSEQUENCE RATING</b><br><i>Rate consequence based on definition of magnitude, spatial extent and duration</i>                    |                         |   |                 |                                |        |
|   |                         | <b>SPATIAL SCALE/ POPULATION</b>  |                 |                                |        |
|   |                         | <b>Site or Local</b>  | <b>Regional</b> | <b>National/ international</b> |        |
| <b>MAGNITUDE</b>  |                         |   |                 |                                |        |
| <b>Minor</b>  | <b>DURATION</b>         | <b>Long term</b>  | Medium          | Medium                         | High   |
|   |                         | <b>Medium term</b>  | Low             | Low                            | Medium |
|   |                         | <b>Short term</b>   | Low             | Low                            | Medium |
| <b>Moderate</b>   | <b>DURATION</b>         | <b>Long term</b>  | Medium          | High                           | High   |
|   |                         | <b>Medium term</b>  | Medium          | Medium                         | High   |
|   |                         | <b>Short term</b>   | Low             | Medium                         | Medium |
| <b>Major</b>  | <b>DURATION</b>         | <b>Long term</b>  | High            | High                           | High   |
|   |                         | <b>Medium term</b>  | Medium          | Medium                         | High   |
|   |                         | <b>Short term</b>   | Medium          | Medium                         | High   |
| <b>PART C: DETERMINING SIGNIFICANCE RATING</b><br><i>Rate significance based on consequence and probability</i>   |                         |   |                 |                                |        |
|   |                         | <b>CONSEQUENCE</b>  |                 |                                |        |
|   |                         | <b>Low</b>  | <b>Medium</b>   | <b>High</b>                    |        |
| <b>PROBABILITY (of exposure to impacts)</b>   | <b>Definite</b>         | Medium  | Medium          | High                           |        |
|   | <b>Possible</b>         | Low   | Medium          | High                           |        |
|   | <b>Unlikely</b>         | Low   | Low             | Medium                         |        |



**PROFESSIONAL CURRICULUM FOR JENNIFER KITTO**

**Name:** Jennifer Kitto  
**Profession:** Heritage Specialist  
**Date of Birth:** 1966-09-11  
**Parent Firm:** PGS Heritage (Pty) Ltd  
**Position in Firm:** Heritage Consultant  
**Years with Firm:** 8 Years  
**Years experience:** 20  
**Nationality:** South African  
**HDI Status:** White Female

**EDUCATION:**

**Name of University or Institution:** Dorset Institute for Higher Education (now Bournemouth University), Poole, United Kingdom

**Degree obtained:** : Higher National Diploma: Practical Archaeology  
**Year** : 1989

**Name of University or Institution** : University of the Witwatersrand  
**Degree obtained** : BA  
**Major subjects** : Archaeology and Social Anthropology  
**Year** : 1993

**Name of University or Institution** : University of the Witwatersrand  
**Degree obtained** : BA [Hons]  
**Major subjects** : Social Anthropology  
**Year** : 1994

**Professional Qualifications:**

Member - Association of Southern African Professional Archaeologists – Technical Member No. 444

**Languages:**

English

Afrikaans - Speaking (Fair) Reading (Fair), Writing (Fair)

**KEY QUALIFICATIONS**

Cultural Resource Management and Heritage Impact Assessment Management, Historical and Archival Research, Archaeology, Anthropology, Applicable survey methods, Fieldwork and Project Management.

**Summary of Experience**

Specialised expertise in Cultural Resource Management and Heritage Impact Assessment Management, Archaeology, Anthropology, Applicable survey methods, Fieldwork and project management, including *inter alia*

-

Limited involvement in various grave relocation projects in the various provinces of South Africa

Involvement with various Heritage Impact Assessments, within South Africa, including -

- Archaeological Walkdowns for various projects
- Phase 2 Heritage Impact Assessments and EMPs for various projects
- Heritage Impact Assessments for various projects
- Heritage Audits and subsequent Compilation of Heritage Management Policy for various projects

## **HERITAGE ASSESSMENT PROJECTS**

Below a selected list of Heritage Impact Assessments (HIA) and Heritage Audit and Management Projects involvement:

- Heritage Screening Reports for Various Road Routes: Bronkhorstspuit, Carletonville and Randfontein and Eikenhof-Vaal Dam regions, Gauteng Department of Roads and Transport, Gauteng Province
- Heritage Audit and Management Policy, Sibanye Gold, Beatrix Mining area, Lejweleputswa District Municipality, Free State Province
- Heritage Audit and Management Policy, Sibanye Gold, Kloof and Driefontein Mining areas, West Rand District Municipality, Gauteng Province
- HIA Report, Dolos-Giraffe Substation, Hopefield-Bultfontein, Free State Province
- HIA Report and Phase 2 Mitigation Report, AEL Mining Services, Decontamination of AEL Detonator Campus, Modderfontein Factory, Modderfontein, City of Johannesburg Metropolitan Municipality, Gauteng
- HIA Report, Old Rand Leases Hostel redevelopment, Fleurhof Ext 10, Roodepoort, City of Johannesburg Metropolitan Municipality, Gauteng
- HIA Report, Watershed Substation, North-West Province
- HIA Report, Solid Waste Landfill Facility, Rhodes Village, Eastern Cape
- HIA Report, Solid Waste Landfill Facility, Rossouw, Eastern Cape
- Phase 2 Mitigation Report, Cass Farmstead, Optimum Colliery, Mpumalanga
- HIA Report, Kusile Ash Disposal Facility, Witbank, Mpumalanga
- Report on Rand Steam Laundries Background History, City of Johannesburg Metropolitan Municipality, Gauteng
- New Cemetery, Barkly East, Senqu Municipality, Eastern Cape (desktop/archival research for HIA report)
- Lady Slipper Country Estates, Nelson Mandela Metro Municipality, Eastern Cape (desktop/archival research for HIA report)
- Exxaro Resources Paardeplaats Project, Belfast, Mpumalanga (field survey and archival research for HIA report)
- Copperleaf Mixed Use Development, Farm Knoppieslaagte 385/Knopjeslaagte 140, Centurion, Gauteng (field survey and archival research for HIA report)
- Isundu-Mbewu Transmission Line Project, Pietermaritzburg, Kwazulu Natal (Initial Heritage Scan (survey) for Corridor 3 Alternative 1)

## GRAVE RELOCATION PROJECTS

Below, a selection of grave relocation projects involvement:

- Mitigation Report on previous Grave Relocation and Permit applications for Test Excavation of two possible graves, Nkomati Mine, Mpumalanga
- Relocation of two graves Olievenhoutbosch, Tshwane, Gauteng (applications to SAHRA, Gauteng Dept. of Health and Local Authorities for relevant permits)
- Relocation of graves HL Hall Family, Nelspruit, Mpumalanga (applications to SAHRA, Mpumalanga Department of Health and Local Authorities for relevant permits)
- Relocation of two possible graves Noordwyk Ext 63, Midrand, Johannesburg, Gauteng (applications to SAHRA, Gauteng Dept. of Health and Local Authorities for relevant permits)
- Relocation of informal cemetery (50+) and additional unknown graves (50+) at Fleurhof Extension 5, Roodepoort, Gauteng (desktop research and applications to SAHRA, Gauteng Health Department and Local Government for relevant permits in terms of the applicable legislation)
- Relocation of informal graves (9) at Tselentis Colliery, Breyten, Mpumalanga (applications to SAHRA, Mpumalanga Department of Health and Local Authorities for relevant permits)
- Relocation of various informal cemeteries at New Largo Mine, Balmoral, Mpumalanga (as above)
- Relocation of graves at Mookodi Power Station, Vryburg, North-West Province (initial social consultation)
- Relocation of graves at Hendrina Power Station, Hendrina, Mpumalanga (social consultation, permit applications, etc)

## EMPLOYMENT SUMMARY:

### Positions Held

- **2011 – to date:** Heritage Specialist - PGS Heritage (Pty) Ltd
- **2008 – 2011:** Cultural Heritage Officer (National), Burial Grounds and Graves Unit: South African Heritage Resources Agency (SAHRA)
- **1998 – 2008:** Cultural Heritage Officer (Provincial), Provincial Office – Gauteng: SAHRA

## **WOUTER FOURIE**

### **Professional Heritage Specialist and Professional Archaeologist and Director PGS Heritage**

#### **Summary of Experience**

Specialised expertise in Archaeological Mitigation and excavations, Cultural Resource Management and Heritage Impact Assessment Management, Archaeology, Anthropology, Applicable survey methods, Fieldwork and project management, Geographic Information Systems, including *inter alia* -

Involvement in various grave relocation projects (some of which relocated up to 1000 graves) and grave “rescue” excavations in the various provinces of South Africa

Involvement with various Heritage Impact Assessments, within South Africa, including -

- Archaeological Walkdowns for various projects
- Phase 2 Heritage Impact Assessments and EMPs for various projects
- Heritage Impact Assessments for various projects
  - Iron Age Mitigation Work for various projects, including archaeological excavations and monitoring
  - Involvement with various Heritage Impact Assessments, outside South Africa, including -
- Archaeological Studies in Democratic Republic of Congo
- Heritage Impact Assessments in Mozambique, Botswana and DRC
- Grave Relocation project in DRC

#### **Key Qualifications**

BA [Hons] (Cum laude) - Archaeology and Geography - 1997

BA - Archaeology, Geography and Anthropology - 1996

Professional Archaeologist - Association of Southern African Professional Archaeologists (ASAPA) - Professional Member

Accredited Professional Heritage Specialist – Association of Professional Heritage Practitioners (APHP)

CRM Accreditation (ASAPA) -

- Principal Investigator - Grave Relocations
- Field Director – Iron Age
- Field Supervisor – Colonial Period and Stone Age
- Accredited with Amafa KZN

#### **Key Work Experience**

2003- current - Director – Professional Grave Solutions (Pty) Ltd

2007 – 2008 - Project Manager – Matakoma-ARM, Heritage Contracts Unit, University of the Witwatersrand

2005-2007 - Director – Matakoma Heritage Consultants (Pty) Ltd

2000-2004 - CEO– Matakoma Consultants

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*Ergo Mining (Pty) Ltd Valley Silts HIA Report*

1998-2000 - Environmental Coordinator – Randfontein Estates Limited. Randfontein, Gauteng

1997-1998 - Environmental Officer – Department of Minerals and Energy. Johannesburg, Gauteng

Worked on various heritage projects in the SADC region including, Botswana, Mozambique, Malawi, Mauritius , Zimbabwe and the Democratic Republic of the Congo